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Medical Essays
AND
OBSERVATIONS,

Revised and Published by

A SOCIETY in *Edinburgh*.

VOLUME II.



EDINBURGH,

Printed by T. and W. RUDDIMANS, for W. MONRO and W. DRUMMOND. Sold by them and the other Booksellers in *Edinburgh*; by Mess. OSBORN and LONGMAN, *London*; and Mess. BRUCE and SMITH, *Dublin*. MDCCXXXIV.



THE
P R E F A C E.

AS we have met with no Objection of great Weight to the Plan laid down in our first Volume, we flatter our selves that it has been generally approved; and therefore have finished our second Volume upon the same Model.

It seems however we have expressed our selves either obscurely or ambiguously in some Particulars; for some Gentlemen have understood us differently from what we would have wished.

It has been thought, that we proposed to confine our Collection to Scotland; whereas we intended our Preface to the first Volume as a general Invitation to all, of whatever Country, who desired to promote the Knowledge of Medicine, to favour us with their Essays or Observations: And we again intreat the Assistance of all those who wish the Advancement of Physick.

Others have remarked, that we had not mentioned the Effects of Chemical Drugs, as a Part of the Subjects to be treated: 'Tis true, this was not fully enough expressed in our Scheme; but we were hopeful

a 2

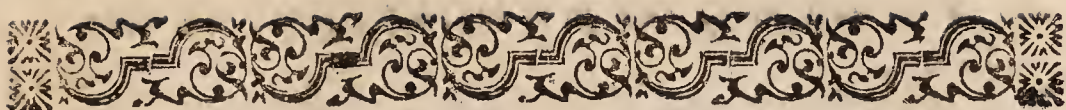
ful our Articles of simple Drugs and chemical Experiments might have included the Uses of their Produce.

We have been told, that our meteorological Register has not a sufficient Number of Observations for each Day, whereby to know the greatest Degree of Heat or Cold: We acknowledge this Remark to be just; but the Circumstances of the Observer are such, as do not conveniently allow of this; and we are afraid some Readers think that Register sufficiently long already,

Several have desired we would make some Application of this Register to the Account of epidemick Diseases: We have put it in every one's Power to make a Comparison; but, in our Judgment, a much greater Number of yearly Observations are required, before any Conclusions concerning the Rise or Return of epidemick Diseases can be made from the State of the Air.

In the Account of Improvements, Discoveries, Books, &c. at the End of this Volume, we have in a great measure supplied the Deficiencies and Omissions of our first Volume; at the publishing of which it was scarce possible that all the medical Books published in the preceeding Year could have been brought us.

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Papers designed for this *Collection* are to be addressed to Mr. *William Monro* Bookseller in *Edinburgh*; and to be delivered to him, or to Mess. *Osborn and Longman* Bookfellers at the Ship in *Pater-noster-row*, *London*, or to Mess. *Bruce and Smith* Bookfellers on the *Blind-key*, *Dublin*, who will transmit them carefully to the *Society*.

Medical



Medical Essays
A. N. D.
OBSERVATIONS.

ARTICLE I.

MANCHESTER.

The Meteorological Register.

THE Instruments with which the Observations in the following Register were made, are the same, and situated in the same Manner, as is described in *Art. II.* of the first Volume of this Collection.

A

JUNE

D.	Hour.	Baro.		Ther.		Hyg.		Wind.		Weather	Rain.	
		In.	D.	In.	D.	I.	D.	Dir.	For.		In.	D.
1	8 a. m.	29	6	13	0	1	5	W.	2	Clear - -	- -	
	4 p. m.	29	6	14	0	1	3	N. E.	1	Clear		
2	8 a. m.	29	8	13	0	1	4	N. W.	2	Clear - -	0,043	
	5 p. m.	29	8	14	4	1	1	N. W.	2	Clear		
3	9 a. m.	30	0	13	3	1	3	W.	2	Clear		
	5 p. m.	30	0	14	9	1	0	N. W.	2	Clear		
4	9 a. m.	30	0	13	5	1	5	N. W.	2	Clear		
	7 p. m.	29	9	15	7	0	7	S. W.	2	Clear		
5	8 a. m.	29	9	15	4	1	0	S. W.	2	Clear		
	6 p. m.	29	9	15	4	1	0	S. W.	1	Cloudy		
6	9 a. m.	29	9	14	6	1	0	W.	2	Clear		
	5 p. m.	29	9	14	6	0	8	W.	2	Clear		
7	9 a. m.	29	9	14	7	1	0	W.	1	Cloudy		
	5 p. m.	29	8	14	8	0	9	N. E.	1	Clear		
8	9 a. m.	29	8	13	7	1	5	E.	2	Clear		
	5 p. m.	29	7	15	2	1	0	E.	2	Clear		
9	9 a. m.	29	7	13	3	1	3	E.	2	Clear		
	5 p. m.	29	6	14	1	1	3	E.	2	Clear		
10	8 a. m.	29	6	13	2	2	0	N. E.	1	Cloudy		
11	9 a. m.	29	7	13	0	1	9	N. E.	2	Cloudy		
	4 p. m.	29	7	13	4	1	2	N. E.	2	Clear		
12	8 a. m.	29	7	13	4	1	4	W.	2	Clear		
	4 p. m.	29	7	14	6	1	3	W.	2	Rain		
13	8 a. m.	29	6	13	1	3	1	N. E.	2	Cloudy		
	5 p. m.	29	6	12	7	1	6	N. E.	2	Clear - -	0,615	
14	9 a. m.	29	6	12	0	2	0	N.	2	Cloudy -	0,052	
	5 p. m.	29	6	13	6	1	4	N. W.	2	Cloudy		
15	8 a. m.	29	6	12	9	1	6	W.	2	Cloudy		
	5 p. m.	29	6	13	7	1	3	W.	2	Clear		
16	8 a. m.	29	6	12	3	2	0	N. W.	2	Rain - -	0,167	
	5 p. m.	29	6	14	5	1	3	W.	2	Clear		
											0,877	

D.	Hour.	Baro.		Ther.		Hyg.		Wind.		Weather.	Rain.
		In.	D.	In.	D.	I.	D.	Dir.	For.		
											0,877
17	9 a. m.	29	7	13	4	1	4	W.	2	Cloudy	
	5 p. m.	29	7	14	7	1	5	W.	2	Rain	
18	9 a. m.	29	8	13	5	1	5	W.	2	Cloudy	
	5 p. m.	29	8	14	5	1	2	W.	2	Clear	
19	8 a. m.	29	7	13	8	1	7	S. W.	1	Rain	
	5 p. m.	29	6	13	3	2	0	E.	1	Rain	
20	8 a. m.	29	5	13	2	1	7	W.	2	Clear - -	0,244
	5 p. m.	29	4	14	5	1	2	W.	2	Clear	
21	8 a. m.	29	4	13	7	1	4	W.	2	Cloudy	
	5 p. m.	29	4	13	8	1	5	W.	1	Lowring	
22	8 a. m.	29	5	13	4	1	7	N. W.	1	Clear	
	5 p. m.	29	6	14	4	1	5	N. E.	1	Cloudy	
23	8 a. m.	29	8	14	1	1	7	N. E.	1	Cloudy	
	5 p. m.	29	8	14	5	1	4	N. E.	1	Clear	
24	8 a. m.	30	0	14	2	1	5	E.	2	Clear - -	0,075
	5 p. m.	30	1	14	3	1	5	E.	2	Clear	
25	9 a. m.	30	2	14	7	1	7	E.	2	Lowring	
	6 p. m.	30	2	14	7	1	6	E.	1	Clear	
26	8 a. m.	30	3	13	9	2	4	E.	2	Fog	
	5 p. m.	30	3	15	4	1	5	E.	2	Clear	
27	8 a. m.	30	3	15	0	1	4	E.	2	Clear	
	4 p. m.	30	3	15	9	1	3	E.	2	Clear	
28	8 a. m.	30	3	14	3	2	3	E.	2	Lowring	
	3 p. m.	30	2	15	5	1	6	E.	2	Clear	
29	8 a. m.	30	1	14	6	1	8	W.	2	Lowring	
	8 p. m.	30	0	15	0	1	4	W.	2	Clear	
30	8 a. m.	30	0	14	7	1	5	W.	2	Clear - -	- -
	4 p. m.	30	0	15	6	1	2	W.	2	Cloudy	

H. at a Med. 29 8 14 1 1 4

Great. Height 30 3 15 9 3 1

Least Height 29 4 12 0 0 7

Total Depth 1,196

D.	Hour.	Baro.		Ther.		Hyg.		Wind.		Weather	Rain.	
		In.	D.	In.	D.	I.	D.	Dir.	For.		In.	D.
1	8 a. m.	30	1	14	4	1	7	N. W.	2	Cloudy -	0,045	
	6 p. m.	30	1	15	5	1	2	N. W.	1	Clear		
2	9 a. m.	30	0	15	0	1	3	N. W.	2	Clear		
	4 p. m.	29	8	15	3	1	2	W.	3	Lowring		
3	8 a. m.	29	6	13	4	1	4	W.	3	Clear		
	4 p. m.	29	7	13	7	1	0	N.	2	Clear		
4	9 a. m.	29	7	12	5	1	1	W.	3	Clear		
	5 p. m.	29	7	14	3	0	9	N. W.	2	Clear		
5	8 a. m.	29	8	13	0	1	1	N. W.	1	Clear		
	6 p. m.	29	8	15	3	1	1	N. W.	1	Clear		
6	8 a. m.	29	8	14	4	1	8	W.	1	Lowring		
	5 p. m.	29	8	15	5	1	3	W.	2	Fog		
7	8 a. m.	29	6	15	2	1	6	S. W.	3	Lowring		
	5 p. m.	29	6	16	1	1	4	S. W.	2	Lowring		
8	9 a. m.	29	4	15	4	1	3	S. W.	3	Lowring		
	5 p. m.	29	5	15	1	1	0	S. W.	3	Clear		
9	9 a. m.	29	5	14	4	1	4	S. W.	1	Lowring		
	4 p. m.	29	4	15	1	1	2	S. W.	1	Lowring		
10	7 a. m.	29	3	13	4	1	6	S. W.	2	Clear		
	6 p. m.	29	2	12	7	1	8	E.	2	Gr. Rain		
11	8 a. m.	29	3	12	3	2	5	W.	2	Lowring	0,685	
	5 p. m.	29	3	13	9	1	3	W.	2	Clear		
12	8 a. m.	29	4	13	3	1	7	W.	1	Clear	0,193	
	4 p. m.	29	4	13	7	1	6	N. E.	1	Clear		
13	8 a. m.	29	3	11	7	3	2	N. E.	1	Clear		
	5 p. m.	29	3	12	6	3	6	N. E.	2	Cloudy		
14	8 a. m.	29	4	12	7	3	1	S. E.	2	Cloudy -	0,367	
	5 p. m.	29	5	13	2	2	9	S. E.	2	Cloudy		
15	8 a. m.	29	7	13	6	2	2	S. E.	2	Rain		
	5 p. m.	29	8	15	2	2	0	S.	2	Lowring		
16	9 a. m.	29	9	14	8	2	0	S.	1	Lowring		
	6 p. m.	29	9	15	4	1	7	E.	0	Clear		

D	Hour.	Baro.		Ther.		Hyg.		Wind.		Weather	Rain.
		In.	D	In.	D.	I.	D.	Dir.	For.		
											1,290
17	8 a.m.	29	9	14	3	1	8	N. W.	1	Clear	
	5 p.m.	29	9	15	3	1	6	N. W.	2	Clear	
18	9 a.m.	29	9	13	4	1	6	N. W.	2	Clear	
	5 p.m.	29	9	14	3	1	6	N. E.	2	Cloudy	
19	8 a.m.	29	9	13	5	1	9	N. E.	2	Clear	
	5 p.m.	29	9	14	7	1	5	N. E.	2	Clear	
20	9 a.m.	29	9	13	8	1	7	W.	2	Clear	
	7 p.m.	29	8	14	7	1	6	W.	2	Cloudy	
21	9 a.m.	29	6	14	3	2	1	S. W.	2	Rain - -	0,632
	5 p.m.	29	5	15	4	1	8	W.	2	Cloudy	
22	8 a.m.	29	6	12	6	3	0	W.	2	Lowring	0,140
	5 p.m.	29	6	13	7	2	5	E.	2	Lowring	
23	9 a.m.	29	2	12	4	3	3	N.	3	Gr. Rain	
	5 p.m.	29	5	12	5	2	3	N. W.	2	Clear	
24	8 a.m.	29	6	12	3	2	2	N. b. W.	2	Clear - -	0,273
	5 p.m.	29	7	13	6	1	7	W. b. N.	2	Clear	
25	8 a.m.	29	8	13	0	1	9	W. b. N.	2	Clear	
	5 p.m.	29	8	14	2	1	5	N. E.	1	Clear	
26	9 a.m.	29	8	13	3	1	6	N. W.	2	Clear - -	0,642
	4 p.m.	29	8	13	4	1	6	N.	1	Cloudy	
27	9 a.m.	29	7	13	0	1	8	N.	1	Clear	
	5 p.m.	29	7	14	9	1	5	S. W.	1	Cloudy	
28	9 a.m.	29	7	13	9	1	5	W.	2	Clear - -	0,157
	4 p.m.	29	7	14	3	1	3	W.	2	Clear	
29	9 a.m.	29	8	13	9	1	6	W. b. N.	2	Clear - -	0,026
	5 p.m.	29	8	14	4	1	2	W.	1	Cloudy	
30	9 a.m.	29	7	14	3	2	5	W. b. N.	2	Cloudy	
	4 p.m.	29	7	14	3	2	5	W. b. N.	2	Cloudy	
31	10 a.m.	29	6	13	6	1	4	W. b. N.	2	Clear - -	0,039
	5 p.m.	29	7	14	2	1	1	N. W.	1	Clear	
H. at a Med.		29	7	13	9	1	7	Total Depth 3,199			
Gr. Height		30	1	16	1	3	6				
Least Height		29	2	11	7	0	9				

D.	Hour.	Baro.		Ther.		Hyg.		Wind.		Weather	Rain.
		In.	D.	In.	D.	I.	D.	Dir.	For.		In. D.
1	9 a. m.	29	8	13	0	1	2	N. W.	0	Clear --	--
	5 p. m.	29	8	13	9	1	1	N. E.	1	Clear	
2	8 a. m.	29	9	13	1	1	6	S. W.	1	Clear --	--
	5 p. m.	29	9	14	1	1	2	N.	1	Clear	
3	8 a. m.	30	0	13	5	1	5	N. W.	1	Clear --	--
	5 p. m.	30	0	14	8	1	3	N.	1	Clear	
4	9 a. m.	30	0	13	7	1	6	S.	1	Clear --	--
	5 p. m.	30	0	14	9	1	1	S. E.	1	Clear	
5	8 a. m.	30	0	13	9	1	5	S. E.	1	Clear	
	6 p. m.	29	9	15	6	1	1	S. E.	0	Cl. high	
6	10 a. m.	30	0	13	7	2	5	E.	1	Cloudy	
	6 p. m.	30	0	14	4	1	8	E.	1	Clear	
7	8 a. m.	29	9	13	8	2	3	S. E.	0	Fog	
	5 p. m.	29	9	15	0	1	7	S. E.	1	Clear	
8	8 a. m.	29	8	13	0	2	5	W.	1	Lowring	
	5 p. m.	29	6	14	6	1	4	W.	2	Clear	
9	9 a. m.	29	5	13	2	2	0	W.	2	Cloudy	
	5 p. m.	29	5	13	6	1	9	E.	0	Cloudy	
10	8 a. m.	29	5	12	2	1	7	N. W.	2	Cloudy	
	5 p. m.	29	5	13	3	1	1	N. W.	2	Cloudy	
11	9 a. m.	29	6	11	9	1	4	N. W.	2	Cloudy	
	7 p. m.	29	7	11	5	1	4	E.	2	Cloudy	
12	9 a. m.	29	5	12	0	1	4	S. W.	0	Cloudy	0,365
	5 p. m.	29	4	12	9	1	5	W.	1	Lowring	
13	9 a. m.	29	3	12	5	2	0	N. E.	1	Lowring	
	6 p. m.	29	3	12	0	3	1	N. E.	2	Gr. Rain	
14	8 a. m.	29	5	11	7	3	4	N. E.	1	Cloudy	
	5 p. m.	29	5	12	7	2	0	N. W.	1	Clear	
15	8 a. m.	29	6	12	0	2	1	W. b. S.	2	Clear	
	5 p. m.	29	5	13	2	1	5	W.	2	Clear	
16	7 a. m.	29	6	12	1	1	7	W. b. S.	1	Clear	
	5 p. m.	29	6	13	4	1	3	W.	2	Clear	

D.	Hour.	Baro.	Ther.	Hyg.	Wind.	Weather	Rain.
		In. D.	In. D.	l. D.	Dir. For.		
							0,365
17	8 a.m.	29 7	12 3	1 7	N. W.	1 Clear	
	5 p.m.	29 7	14 0	1 2	W.	1 Cloudy	
18	8 a.m.	29 7	13 5	1 6	S. W.	2 Clear	
	5 p.m.	29 6	14 9	1 6	S.	2 Cloudy	
19	8 a.m.	29 5	14 0	1 9	N. W.	2 Cloudy	
	6 p.m.	29 5	14 3	1 5	W.b. N.	2 Clear	
20	8 a.m.	29 6	13 6	2 0	S. W.	1 Rain	0,432
	6 p.m.	29 5	14 0	2 0	S.	2 Cloudy	
21	9 a.m.	29 4	14 5	1 8	S. W.	2 Cloudy	
	5 p.m.	29 5	15 0	1 6	S. W.	2 Clear	
22	9 a.m.	29 7	12 2	1 8	N. E.	2 Cloudy	
	6 p.m.	29 7	12 7	1 5	E. b. N.	2 Clear	
23	8 a.m.	29 6	12 4	1 8	E.	1 Rain	
	5 p.m.	29 5	13 5	1 7	S. W.	0 Rain	
24	8 a.m.	29 8	12 5	2 1	W.	2 Clear	
	4 p.m.	29 9	13 7	1 3	W.	2 Clear	
25	8 a.m.	29 9	13 5	1 5	S. W.	1 Clear	
	5 p.m.	29 8	14 2	1 5	S. W.	2 Rain	
26	8 a.m.	29 7	14 6	1 7	S. W.	2 Cloudy	
	5 p.m.	29 7	13 6	2 0	W.	2 Rain	
27	9 a.m.	29 9	12 6	1 8	W. b. N.	2 Clear	
	6 p.m.	30 0	13 7	1 2	W. b. N.	2 Clear	
28	8 a.m.	31 0	12 4	1 5	N. W.	0 Cloudy	
	5 p.m.	31 0	13 0	1 3	N. E.	2 Clear	
29	7 a.m.	31 0	11 6	1 5	N. E.	1 Clear	
	5 p.m.	30 1	12 4	1 4	E.	1 Clear	
30	9 a.m.	30 0	12 6	1 8	S. W.	1 Clear	
	5 p.m.	30 0	14 2	1 5	W.	1 Clear	
31	9 a.m.	30 0	12 7	1 5	W.	2 Clear	0,828

H. at a Med.	29 9	13 3	1 6
Gr. Height	31 1	15 6	3 4
Least Height	29 3	11 5	1 1

Total Depth 1,625

D.	Hour.	Baro.		Ther.		Hyg.		Wind.		Weather	Rain.	
		In.	D.	In.	D.	I.	D.	Dir.	For.		In.	D.
1	8 a. m.	30	2	12	3	1	6	N. W.	1	Clear		
	4 p. m.	30	2	14	0	1	3	N. W.	1	Clear		
2	8 a. m.	30	2	12	4	2	0	N. E.	1	Clear		
	4 p. m.	30	3	14	2	1	4	N. E.	1	Clear		
3	9 a. m.	30	3	12	5	2	5	E.	1	Mist		
	6 p. m.	30	3	12	7	2	5	E.	1	Mist		
4	8 a. m.	30	2	11	7	2	7	N.	0	Mist		
	5 p. m.	30	1	13	6	1	8	N.	1	Mist		
5	8 a. m.	30	1	12	2	2	9	N. E.	0	Mist		
	5 p. m.	30	0	13	3	2	6	N. E.	1	Mist		
6	8 a. m.	29	8	12	6	2	0	S. W.	2	Clear		
	5 p. m.	29	7	14	2	1	4	W.	2	Cloudy		
7	8 a. m.	29	8	12	8	1	9	E.	0	Cloudy		
	4 p. m.	29	9	13	6	1	6	E.	0	Cloudy		
8	8 a. m.	29	7	13	3	1	9	S. E.	1	Cloudy		
	4 p. m.	29	6	14	6	1	5	S. W.	0	Clear		
9	9 a. m.	29	5	13	9	1	7	S. W.	0	Cloudy		
	6 p. m.	29	5	12	7	1	8	S. W.	1	Cloudy		
10	9 a. m.	29	5	12	7	1	7	S. W.	1	Cloudy		
	6 p. m.	29	2	13	6	1	6	S. W.	3	Lowring		
11	9 a. m.	29	2	13	0	1	6	S. W.	3	Clear		
	5 p. m.	28	6	12	5	1	6	S. W.	4	Tempest		
12	9 a. m.	28	8	12	1	1	6	W.	3	Cloudy		
	4 p. m.	29	0	12	1	1	4	N. W.	2	Clear		
13	8 a. m.	28	8	10	5	1	8	W.	2	Clear		
	6 p. m.	28	9	11	7	1	6	W.	2	Cloudy		
14	8 a. m.	29	1	10	8	1	5	N. b. W.	2	Clear		
	4 p. m.	29	2	12	1	1	1	N. W.	3	Cloudy		
15	8 a. m.	28	9	11	8	1	3	S. W.	2	Rain		
	5 p. m.	28	8	11	5	1	5	S. W.	2	Rain		
16	8 a. m.	29	5	10	3	1	5	N.	1	Fair		
	5 p. m.	29	6	11	6	1	1	W.	2	Fair		

The Register of Rain was not kept this Month.

D.	Hour.	Baro.		Ther.		Hyg.		Wind.		Weather	Rain.
		In.	D.	In.	D.	I.	D.	Dir.	For.		
17	9 a. m.	29	0	11	8	1	7	N. W.	2	Fair	
	5 p. m.	29	0	10	7	1	5	W.	3	Fair	
18	8 a. m.	28	9	11	5	1	8	W.	3	Fair	
	7 p. m.	29	1	11	4	1	8	W.	2	Fair	
19	8 a. m.	29	3	10	8	2	0	W.	1	Fair	
	7 p. m.	29	4	10	8	1	7	W.	1	Fair	
20	8 a. m.	29	7	10	3	1	8	W.	1	Fair	
21	8 a. m.	29	5	12	8	1	6	W.	4	Storm	
	4 p. m.	29	6	13	0	1	3	W.	4	Storm	
22	8 a. m.	29	8	11	8	1	5	S. W.	2	Cloudy	
	4 p. m.	29	7	12	6	1	6	S. W.	2	Cloudy	
23	8 a. m.	29	7	11	5	2	0	W.	1	Cloudy	
24	9 a. m.	29	6	13	2	2	1	S. W.	0	Cloudy	
	5 p. m.	29	7	13	7	2	1	S. W.	0	Rain	
25	8 a. m.	29	8	12	3	2	1	W.	2	Fair	
	5 p. m.	30	0	13	1	1	5	W.	0	Fair	
26	8 a. m.	30	2	11	8	2	0	S. E.	0	Fair	
	5 p. m.	30	3	11	9	1	7	E.	1	Fair	
27	8 a. m.	30	2	11	8	1	7	E.	1	Cloudy	
	5 p. m.	30	0	12	4	1	5	S. E.	2	Cloudy	
28	8 a. m.	29	9	11	4	1	5	S. E.	1	Cloudy	
	5 p. m.	29	9	12	1	1	5	S. E.	1	Cloudy	
29	8 a. m.	30	1	10	5	1	7	S. E.	0	Fair	
	5 p. m.	30	1	11	9	1	5	S. E.	1	Fair	
30	8 a. m.	30	2	9	8	1	6	S. E.	0	Fair	
	5 p. m.	30	2	11	2	1	4	S. E.	1	Fair	

H. at a Med.	29	6	12	2	1	7
Great. Height	30	3	14	6	2	9
Least Height	28	3	9	8	1	1

Total Depth ———

D.	Hour.	Baro.		Ther.		Hyg.		Wind.		Weather	Rain.	
		In.	D.	In.	D.	l.	D.	Dir.	For.		In.	D.
1	9 a.m.	30	1	10	8	1	4	S. E.	1	Fair		
	5 p.m.	30	0	11	1	1	3	S. E.	1	Fog		
2	8 a.m.	29	9	10	4	1	5	S. E.	1	Cloudy	0,062	
	5 p.m.	29	7	11	3	1	6	E.	1	Cloudy		
3	8 a.m.	29	4	10	8	1	5	E.	1	Cloudy		
	5 p.m.	29	2	10	7	2	6	N. E.	2	Rain		
4	9 a.m.	29	1	10	4	3	0	N. E.	1	Fair		
	5 p.m.	29	2	10	9	2	4	W.	1	Cloudy		
5	9 a.m.	29	2	9	9	2	4	S. W.	1	Fair		
	4 p.m.	29	1	11	2	2	1	E.	1	Rain		
6	8 a.m.	29	3	9	8	2	3	N. W.	1	Clear	0,213	
	5 p.m.	29	3	11	0	1	5	W. b. N.	1	Clear		
7	9 a.m.	29	3	10	4	2	0	S. E.	1	Rain		
	5 p.m.	29	1	11	4	2	2	S. E.	1	Rain		
8	9 a.m.	29	1	11	1	2	5	S. W.	1	Fair		
	5 p.m.	29	2	11	9	2	0	S. W.	1	Cloudy		
9	8 a.m.	29	0	12	1	2	3	S.	1	Fair		
	5 p.m.	29	0	12	7	1	8	S. b. W.	1	Fair		
10	8 a.m.	29	0	11	7	2	0	S. W.	2	Fair		
	4 p.m.	29	1	11	6	1	8	W.	3	Fair		
11	9 a.m.	29	2	10	5	1	9	S. E.	2	Fog		
	4 p.m.	29	0	11	9	2	2	S. W.	1	Cloudy		
12	9 a.m.	29	1	11	4	2	2	S. W.	0	Fog		
	5 p.m.	29	0	11	9	2	5	S. b. E.	1	Rain		
13	8 a.m.	29	1	10	4	2	5	S. W.	0	Cloudy	0,685	
	4 p.m.	29	0	11	1	2	7	W.	1	Rain		
14	8 a.m.	29	4	10	4	2	2	S. W.	1	Fair		
	5 p.m.	29	4	10	5	2	2	S. b. W.	1	Fair		
15	9 a.m.	29	2	11	4	2	7	S. b. W.	1	Cloudy		
	4 p.m.	29	0	12	2	2	0	S. b. W.	0	Cloudy		
16	8 a.m.	29	4	10	6	2	5	S. W.	0	Fair	0,426	
	5 p.m.	29	2	11	3	2	2	S. W.	1	Rain		

D.	Hour.	Baro.		Ther.		Hyg		Wind.		Weather	Rain.
		In.	D.	In.	D.	I.	D.	Dir.	For.		
											1,386
17	8 a. m.	29	0	11	6	2	3	S. W.	2	Cloudy	
	5 p. m.	28	9	11	8	2	0	S. W.	2	Cloudy	
18	8 a. m.	29	0	10	9	2	1	S. W.	2	Fair	
	5 p. m.	29	1	10	6	2	1	S. W.	2	Cloudy	
19	8 a. m.	29	4	10	8	2	1	S. W.	0	Fog - -	0,395
	5 p. m.	29	5	11	4	2	3	E.	1	Cloudy	
20	9 a. m.	29	5	10	8	3	0	N. W.	0	Cloudy	
	5 p. m.	29	5	10	7	3	0	N. E.	0	Cloudy	
21	8 a. m.	29	4	10	7	2	9	S. E.	1	Cloudy	
	5 p. m.	29	4	11	1	2	5	S. E.	1	Fair	
22	9 a. m.	29	5	11	3	2	3	S. W.	1	Cloudy	
	5 p. m.	29	5	11	6	2	2	S. W.	1	Cloudy	
23	8 a. m.	29	7	10	6	2	5	S. E.	1	Fair	
	4 p. m.	29	7	11	4	3	0	E.	2	Cloudy	
24	9 a. m.	29	6	11	2	3	7	N. E.	2	Rain	
	5 p. m.	29	6	11	5	3	9	N. E.	2	Rain	
25	9 a. m.	29	5	11	9	3	9	S. E.	1	Fog	
	5 p. m.	29	6	11	8	3	9	S. E.	1	Fog	
26	9 a. m.	29	5	12	3	2	6	S. E.	1	Fair - -	0,530
	5 p. m.	29	5	12	3	2	9	S. E.	1	Fair	
27	9 a. m.	29	7	11	5	3	6	S. E.	1	Fog	
	4 p. m.	29	6	11	6	3	4	S. E.	1	Fog	
28	9 a. m.	29	4	11	3	2	6	W.	2	Cloudy	
	4 p. m.	29	4	10	6	2	1	W.	1	Fair	
29	8 a. m.	29	6	9	5	2	4	W.	1	Fair	
	4 p. m.	29	7	10	4	2	2	N. W.	2	Fair	
30	9 a. m.	29	8	10	2	2	5	W.	1	Cloudy -	0,212
	5 p. m.	29	9	10	5	2	5	W.	1	Cloudy	
31	8 a. m.	29	9	10	5	2	4	W.	0	Cloudy	
	5 p. m.	29	9	10	7	2	1	S. W.	1	Cloudy	
H. at a Med.		29	3	11	1	2	4	Total Depth 2,523			
Great Height		30	1	12	7	3	9				
Least Height		28	9	9	5	1	3				

D.	Hour.	Baro.		Ther.		Hyg.		Wind.		Weather	Rain.	
		In.	D.	In.	D.	L.	D.	Dir.	For.		In.	D.
1	8 a.m.	29	9	9	9	2	1	S.	0	Fair		
	5 p.m.	29	9	10	3	2	3	S.	0	Fair		
2	8 a.m.	29	9	10	0	2	3	S. E.	2	Cloudy		
	5 p.m.	30	0	9	5	2	1	S. E.	1	Cloudy		
3	8 a.m.	30	1	9	4	2	2	S. E.	1	Fog		
	5 p.m.	30	1	10	0	2	2	S. E.	1	Fog		
4	9 a.m.	30	1	9	5	2	2	S. E.	1	Cloudy		
	5 p.m.	30	1	9	7	2	2	S. E.	1	Cloudy		
5	9 a.m.	30	1	8	3	2	2	S. W.	0	Cloudy		
	5 p.m.	30	1	9	0	2	3	S. W.	0	Fair		
6	8 a.m.	30	2	8	2	2	4	S. W.	0	Fair		
	5 p.m.	30	2	9	6	2	1	S. W.	0	Fair		
7	8 a.m.	30	2	9	3	2	8	S. W.	2	Fair		
	5 p.m.	30	3	9	4	2	8	S. W.	0	Fog		
8	8 a.m.	30	3	8	7	3	1	W.	1	Fog		
	5 p.m.	30	3	9	2	3	3	W.	1	Fog		
9	8 a.m.	30	2	9	7	3	2	W.	1	Fog - -	0,025	
	5 p.m.	30	1	9	9	3	0	W.	0	Fog		
10	9 a.m.	30	0	9	9	3	0	W.	0	Fog		
	5 p.m.	29	7	9	9	2	9	W.	0	Fog		
11	8 a.m.	29	6	9	1	2	8	S.	1	Cloudy		
	5 p.m.	29	5	9	5	2	8	S. E.	1	Fair		
12	9 a.m.	29	6	10	4	2	9	S. E.	1	Fog		
	4 p.m.	29	7	10	5	2	6	S. E.	1	Fog		
13	9 a.m.	29	7	10	9	2	9	S. E.	1	Rain - -	0,075	
	5 p.m.	29	7	10	2	2	7	S. E.	2	Fog		
14	9 a.m.	29	8	9	5	3	5	S. E.	2	Cloudy -	0,257	
	5 p.m.	29	9	9	7	3	4	N. W.	2	Cloudy		
15	9 a.m.	29	8	8	7	2	3	N. b. W.	3	Cloudy -	0,033	
	5 p.m.	29	8	8	4	2	0	N. b. W.	2	Cloudy		
16	9 a.m.	29	7	9	1	2	0	N. E.	3	Fair		
	5 p.m.	29	8	8	7	1	8	N.	3	Fair		

D.	Hour.	Baro.		Ther.		Hyg.		Wind.		Weather	Rain.	
		In.	D.	In.	D.	I.	D.	Dir.	For.			
											0,390	
17	9 a. m	29	8	8	3	1	8	W.	2	Fair		
	5 p. m	29	4	9	5	1	7	W. b. S.	2	Fair		
18	9 a. m	29	5	7	2	1	9	N. W.	1	Fair		
	5 p. m	29	5	7	4	1	9	N. W.	1	Fair		
19	9 a. m	29	4	6	7	2	0	N. W.	1	Fair		
	4 p. m	29	5	7	7	1	8	N. W.	3	Fair		
20	9 a. m	29	8	7	5	1	9	N. W.	1	Cloudy		
	5 p. m	29	9	8	3	1	7	N. W.	2	Cloudy		
21	9 a. m	30	0	7	4	2	0	N. W.	0	Fair - -	0,012	
	5 p. m	30	0	9	0	2	0	S.	1	Cloudy		
22	9 a. m	30	1	10	5	2	9	S.	1	Cloudy		
	5 p. m	30	2	10	6	3	2	S.	0	Cloudy		
23	9 a. m	30	3	10	4	3	0	W.	1	Cloudy -	0,005	
	5 p. m	30	4	10	4	2	9	W.	1	Cloudy		
24	9 a. m	30	4	10	4	2	7	N. W.	1	Fair		
	4 p. m	30	4	9	9	2	7	W.	1	Fair		
25	9 a. m	30	4	9	9	2	9	W.	1	Fair		
	4 p. m	30	4	9	6	2	9	W.	1	Fair		
26	9 a. m	30	3	10	1	2	9	W.	1	Fair - -	0,008	
	5 p. m	30	2	10	4	2	7	W.	1	Fair		
27	9 a. m	30	0	10	1	2	8	W.	1	Fair		
	5 p. m	30	0	9	5	2	5	N. b. W.	1	Fair		
28	9 a. m	30	1	7	4	2	0	N. b. W.	1	Fair		
	5 p. m	30	1	8	3	1	9	N. b. W.	2	Fair		
29	9 a. m	29	8	9	9	2	5	W. b. S.	3	Cloudy		
	3 p. m	29	8	10	5	2	5	W. b. S.	3	Cloudy		
30	9 a. m	29	7	9	0	1	4	W.	2	Cloudy		
	5 p. m	29	9	9	2	2	1	W.	2	Cloudy		
H. at a Med.		29	8	9	3	2	4	Total Depth				0,415
Great. Height		30	4	10	6	3	5					
Least Height		29	4	7	2	1	4					

D.	Hour.	Baro.		Ther.		Hyg.		Wind.		Weather	Rains	
		In.	D.	In.	D.	I.	D.	Dir.	For.		In.	D.
1	9 a.m.	30	1	8	2	2	3	W.	2	Fair		
	5 p.m.	30	1	8	8	2	4	W.	2	Fair		
2	9 a.m.	30	1	8	9	1	9	N. W.	2	Fair		
	4 p.m.	30	1	8	7	1	9	N. W.	2	Fair		
3	9 a.m.	30	1	9	0	2	0	S. W.	2	Cloudy		
	5 p.m.	29	9	9	7	2	2	S. W.	2	Cloudy		
4	9 a.m.	29	6	10	0	2	6	W.	2	Fair		
	5 p.m.	29	7	8	8	2	2	N. W.	1	Fair		
5	9 a.m.	29	8	9	0	2	2	N.	1	Fair		
	5 p.m.	29	9	9	1	2	1	N.	1	Fair		
6	9 a.m.	30	0	8	0	2	0	N.	1	Fair		
	5 p.m.	30	0	7	7	2	5	N. b. W.	0	Fair		
7	9 a.m.	30	1	7	0	3	0	N.	1	Fair		
	5 p.m.	30	3	8	5	2	4	N.	1	Fog		
8	9 a.m.	30	4	9	1	2	3	E.	1	Fog		
	5 p.m.	30	4	9	1	2	3	E.	1	Fair		
9	9 a.m.	30	3	9	1	2	3	E. b. S.	2	Fair		
	5 p.m.	30	3	9	1	2	3	S. E.	2	Fog	--	0,032
10	9 a.m.	30	2	8	7	2	0	S. E.	2	Fair		
	4 p.m.	30	1	9	2	2	1	S. E.	2	Fair		
11	9 a.m.	29	9	7	0	2	2	S. E.	1	Fog		
	5 p.m.	29	8	7	5	2	3	S. E.	2	Fair		
12	9 a.m.	29	8	7	5	2	5	S. E.	0	Fog		
	5 p.m.	29	8	8	0	2	5	S. E.	1	Fog		
13	9 a.m.	29	9	8	5	2	6	S. E.	1	Fog		
	5 p.m.	29	9	8	7	2	3	S. E.	0	Fog		
14	9 a.m.	29	8	6	7	2	5	S.	2	Fair		
	5 p.m.	29	7	6	6	2	4	S.	1	Fair		
15	9 a.m.	29	7	7	4	2	4	S.	1	Fog		
	5 p.m.	29	6	7	5	3	0	S.	1	Fog		
16	9 a.m.	29	6	8	1	3	0	S. E.	1	Fog		
	5 p.m.	29	6	8	4	2	5	S. E.	1	Fair		

D.	Hour.	Baro.		Ther.		Hyg.		Wind.		Weather	Rain.
		In.	D.	In.	D.	I.	D.	Dir.	For.		
											0,032
17	9 a. m.	29	5	9	2	2	8	S.	1	Fair	
	4 p. m.	29	5	9	4	2	7	S.	1	Fair	
18	9 a. m.	29	4	8	8	3	1	W. b. S.	1	Fog	
	5 p. m.	29	4	8	1	3	1	W. b. S.	1	Fog	
19	9 a. m.	29	3	8	3	3	3	S. b. E.	1	Fog - -	0,095
	5 p. m.	29	3	9	0	3	4	S. b. E.	0	Fog	
20	9 a. m.	29	2	9	1	3	3	S.	0	Fog - -	0,210
	5 p. m.	29	1	9	5	3	2	S.	0	Fog	
21	9 a. m.	29	3	10	0	3	0	S.	0	Fog - -	0,172
	5 p. m.	29	0	10	3	3	2	W.	0	Fog	
22	9 a. m.	28	9	10	0	3	4	E.	2	Rain - -	0,395
	5 p. m.	29	1	9	8	3	8	E.	2	Rain	
23	9 a. m.	29	5	9	4	3	6	E.	2	Rain - -	0,350
	5 p. m.	29	6	9	5	3	3	E.	2	Rain	
24	9 a. m.	29	6	10	4	3	3	S.	3	Rain - -	0,410
	4 p. m.	29	5	11	8	3	0	S.	3	Cloudy	
25	9 a. m.	29	5	10	5	2	3	S. W.	0	Cloudy	0,382
	5 p. m.	29	4	11	3	3	0	S. W.	1	Cloudy	
26	9 a. m.	29	4	10	5	2	7	S. W.	1	Cloudy	0,256
	4 p. m.	29	4	10	3	2	5	S. W.	1	Cloudy	
27	9 a. m.	29	3	9	4	2	7	S. W.	2	Cloudy	0,210
	4 p. m.	29	3	10	1	2	8	S. W.	2	Cloudy	
28	9 a. m.	29	2	9	6	3	0	S. W.	2	Cloudy	0,457
	5 p. m.	29	1	9	5	2	6	W.	2	Cloudy	
29	9 a. m.	28	8	9	0	2	7	W.	2	Snow -	0,365
	5 p. m.	28	6	9	8	2	5	S. W.	2	Cloudy	
30	9 a. m.	28	2	10	6	2	5	S. W.	3	Rain - -	0,198
	4 p. m.	28	2	10	5	2	5	S. W.	3	Cloudy	
31	9 a. m.	28	8	10	0	2	4	N. W.	2	Fair - -	0,085
	4 p. m.	29	0	9	5	2	0	W.	2	Fair	
H. at a Med.		29	8	9	1	2	6	Total Depth			3,617
Gr. Height		30	4	11	8	3	8				
Least Height		28	2	6	6	1	9				

D.	Hour.	Baro.		Ther.		Hyg.		Wind.		Weather	Rain.	
		In.	D.	In.	D.	I.	D.	Dir.	For.		In.	D.
1	9 a.m.	29	3	9	4	2	2	N. W.	2	Fair		
	5 p.m.	29	6	8	6	2	1	W.b.N.	2	Fair		
2	9 a.m.	29	5	9	6	2	3	S. W.	2	Rain - -	0,054	
	4 p.m.	29	3	10	6	2	5	S. W.	2	Cloudy		
3	9 a.m.	29	4	9	7	2	3	S. W.	2	Fair - -	0,135	
	5 p.m.	29	3	9	8	2	3	S. W.	3	Cloudy		
4	9 a.m.	29	1	10	6	2	2	S. W.	3	Rain - -	0,217	
	5 p.m.	29	0	11	7	2	3	S. W.	4	Cloudy		
5	9 a.m.	29	2	10	6	2	0	S. W.	3	Fair		
	5 p.m.	29	3	10	7	2	0	S. W.	2	Rain		
6	9 a.m.	29	5	9	9	2	0	S. W.	2	Fair - -	0,190	
	4 p.m.	29	6	10	0	2	0	S. W.	2	Fair		
7	9 a.m.	29	7	10	3	2	1	S.	2	Fair - -	0,083	
	4 p.m.	29	6	10	2	2	0	S.	2	Fog		
8	9 a.m.	29	2	10	8	2	4	S. W.	1	Rain		
	5 p.m.	29	2	10	3	2	2	W.	2	Fair		
9	9 a.m.	29	2	9	2	2	4	W.	2	Fair - -	0,225	
	5 p.m.	29	2	10	2	2	2	W.	2	Fair		
10	9 a.m.	29	4	9	3	2	3	W.	2	Fair		
	5 p.m.	29	5	9	5	2	1	S. W.	3	Fair		
11	9 a.m.	29	5	10	0	2	2	S. W.	2	Cloudy		
	5 p.m.	29	5	10	1	2	0	S. W.	2	Cloudy		
12	9 a.m.	29	5	8	7	2	1	E.	1	Fair - -	0,053	
	5 p.m.	29	6	9	6	2	0	E.	1	Cloudy		
13	9 a.m.	29	6	9	1	2	1	S.	1	Fair		
	5 p.m.	29	6	9	4	2	0	S. W.	1	Fair		
14	9 a.m.	29	6	8	3	2	2	S. W.	1	Cloudy		
	5 p.m.	29	6	8	4	2	1	S. W.	1	Fog		
15	9 a.m.	29	6	9	4	2	3	S.	1	Fair		
	5 p.m.	29	6	9	2	2	1	S. W.	2	Fair		
16	9 a.m.	29	7	10	8	2	2	S.	2	Cloudy		
	5 p.m.	29	7	10	7	2	2	S.	1	Cloudy		

D.	Hour.	Baro.		Ther.		Hyg.		Wind.		Weather	Rain.
		In.	D.	In.	D.	I.	D.	Dir.	For.		
											0,957
17	9 a.m.	29	8	10	7	2	2	S. W.	1	Rain	
	5 p.m.	29	9	10	4	2	6	S. W.	1	Rain	
18	9 a.m.	30	0	10	3	2	4	S. W.	1	Cloudy	
	5 p.m.	31	0	10	4	2	4	S. W.	2	Cloudy	
19	9 a.m.	30	1	9	3	2	3	S.	2	Fair - -	0,093
	5 p.m.	30	1	7	7	2	0	S. W.	1	Fair	
20	9 a.m.	30	1	7	7	1	6	W.	1	Fair	
	5 p.m.	30	1	8	2	1	5	S.	1	Fair	
21	9 a.m.	30	2	7	0	1	7	S.	1	Fair	
	5 p.m.	30	2	8	5	1	8	S.	2	Fair	
22	9 a.m.	30	2	7	8	2	1	S. E.	2	Fair	
	5 p.m.	30	2	8	2	1	9	S. E.	2	Fair	
23	9 a.m.	30	1	8	4	2	2	S. E.	2	Fair	
	5 p.m.	30	1	10	2	2	3	S. W.	2	Cloudy	
24	9 a.m.	30	0	11	1	2	3	S. W.	2	Cloudy	
	4 p.m.	30	1	11	6	2	2	S. W.	2	Cloudy -	0,055
25	9 a.m.	30	0	11	1	2	2	S. W.	2	Fair	
	5 p.m.	29	9	12	1	2	2	S. W.	3	Fair	
26	9 a.m.	30	0	10	8	2	1	S. W.	3	Fair	
	5 p.m.	30	1	11	2	2	0	S. W.	2	Fair	
27	9 a.m.	30	1	10	4	2	2	S. W.	1	Rain *	0,105
	4 p.m.	30	1	10	4	2	4	S. W.	2	Fair	
28	9 a.m.	30	2	9	9	2	4	S. W.	1	Cloudy -	0,091
	5 p.m.	30	1	10	2	2	3	S. W.	1	Cloudy	
29	9 a.m.	29	6	10	7	2	0	S. W.	2	Cloudy	
	5 p.m.	29	3	11	2	2	1	S. W.	3	Cloudy	
30	9 a.m.	29	1	10	5	2	1	S. W.	4	Fair - -	0,068
	5 p.m.	29	3	10	1	1	9	S. W.	3	Fair	
31	9 a.m.	29	0	9	1	1	9	S. W.	3	Fair	
	5 p.m.	29	1	9	7	1	9	S. W.	2	Fair	

H. at a Med. 29 8 9 6 2 1 Total Depth 1,370

Gr. Height 31 0 12 1 2 6

Least Height 29 0 7 0 1 5

B

* Rain when Mercury is at 30 is very extraordinary.

D.	Hour.	Baro.		Ther.		Hyg.		Wind.		Weather	Rain.	
		In.	D.	In.	D.	I.	D.	Dir.	For.		In.	D.
1	9 a.m.	29	2	10	6	2	2	S. W.	4	Rain --	0,135	
	5 p.m.	29	1	11	4	2	2	S. W.	4	Rain		
2	9 a.m.	28	9	10	1	2	2	S. W.	2	Cloudy -	0,193	
	5 p.m.	29	0	9	2	2	3	S. W.	2	Cloudy		
3	9 a.m.	29	2	9	7	2	1	S. W.	3	Fair --	0,233	
	5 p.m.	29	1	9	8	2	1	S. W.	2	Fair		
4	9 a.m.	28	9	9	5	2	1	S. W.	3	Fair --	0,089	
	4 p.m.	28	8	10	0	1	7	S. W.	3	Cloudy		
5	9 a.m.	29	0	9	6	2	0	W.	2	Fair	0,063	
	5 p.m.	29	4	10	6	1	8	N. W.	2	Fair --		
6	9 a.m.	29	8	9	2	2	3	W.	2	Fair		
	5 p.m.	29	8	10	3	2	2	S. W.	2	Cloudy		
7	9 a.m.	29	6	10	8	2	2	S. W.	2	Cloudy		
	5 p.m.	29	6	10	6	2	0	W.	2	Rain		
8	9 a.m.	29	4	9	5	2	2	E.	1	Rain		
	5 p.m.	29	3	8	8	3	0	N. E.	3	Rain		
9	9 a.m.	29	4	9	0	2	6	N.	2	Fair --	0,514	
	5 p.m.	29	5	9	6	2	0	N.	1	Fair		
10	9 a.m.	29	6	8	5	2	4	N.	1	Fair		
	5 p.m.	29	6	10	0	2	3	W.	2	Fair		
11	9 a.m.	29	3	11	3	2	5	S. W.	3	Cloudy		
	5 p.m.	29	3	11	0	2	3	W.	3	Cloudy		
12	9 a.m.	29	5	9	4	2	2	S. W.	3	Cloudy		
	5 p.m.	29	6	10	3	2	1	W.	3	Cloudy		
13	9 a.m.	29	4	11	2	2	2	S. W.	3	Fair		
	5 p.m.	29	4	11	7	2	0	S. W.	3	Cloudy		
14	9 a.m.	29	6	9	8	2	1	S. W.	2	Fair		
	5 p.m.	29	7	10	3	1	8	W.	2	Fair		
15	9 a.m.	29	8	9	7	2	2	S. W.	2	Fair --	0,137	
	5 p.m.	29	8	10	7	2	0	S. W.	2	Fair		
16	9 a.m.	29	8	10	7	2	2	S. W.	2	Fair		
	5 p.m.	29	7	11	5	1	9	S. W.	3	Cloudy		

D	Hour.	Baro.		Ther.		Hyg.		Wind.		Weath	Rain.
		In.	D	In.	D	I.	D.	Dir.	For.		
											1,334
17	9 a. m.	29	8	9	5	2	0	S. W.	3	Fair	
	5 p. m.	29	7	10	7	2	0	S. W.	3	Fair	
18	9 a. m.	29	7	11	0	2	0	S. W.	2	Cloudy	
	5 p. m.	29	6	10	8	1	8	S. W.	2	Fair	
19	9 a. m.	29	3	10	3	1	9	S. E.	2	Cloudy	0,092
	5 p. m.	29	4	9	3	1	9	S. W.	2	Cloudy	
20	9 a. m.	29	3	9	3	2	1	S. E.	2	Rain - -	0,373
	5 p. m.	29	3	9	5	2	4	S. E.	2	Rain	
21	9 a. m.	29	3	9	5	2	6	S. W.	1	Cloudy	
	5 p. m.	29	4	10	2	2	5	S. W.	1	Cloudy	
22	9 a. m.	29	4	9	5	2	3	S.	3	Fair - -	0,315
	5 p. m.	29	4	10	1	2	0	S. W.	4	Cloudy	
23	9 a. m.	29	2	9	6	1	4	S. E.	2	Cloudy	0,142
	5 p. m.	29	4	10	2	2	1	S. E.	2	Cloudy	
24	9 a. m.	29	6	10	0	2	2	S. E.	1	Cloudy	
	5 p. m.	29	7	10	7	1	8	S. W.	1	Cloudy	
25	9 a. m.	29	5	9	8	2	0	W.	2	Fair - -	0,094
	5 p. m.	29	7	9	4	2	0	W.	3	Fair	
26	9 a. m.	29	4	10	3	2	1	S. W.	4	Rain - -	0,110
	5 p. m.	29	4	9	7	1	8	S. W.	2	Cloudy	
27	9 a. m.	29	4	9	3	2	0	S. W.	3	Rain	
	5 p. m.	29	4	8	6	2	2	S. W.	2	Snow	
28	9 a. m.	29	6	9	8	2	2	S. W.	2	Cloudy	0,065
	5 p. m.	29	5	11	1	2	0	S. W.	2	Cloudy	

H. at a Med.	29	6	9	9	2	1
Great. Height	29	8	11	7	3	0
Least Height	28	8	8	5	1	4

Total Depth 2,525

D.	Hour.	Baro.		Ther.		Hyg.		Wind.		Weather	Rain.	
		In.	D.	In.	D.	I.	D.	Dir.	For.		In.	D.
1	9 a.m.	29	7	11	8	2	4	S. W.	2	Cloudy	0,035	
	5 p.m.	29	5	11	9	2	0	S. W.	4	Cloudy		
2	9 a.m.	29	6	10	5	2	1	S. W.	2	Cloudy		
	5 p.m.	29	9	10	2	1	7	N.	3	Fair	0,073	
3	9 a.m.	30	2	9	4	2	2	W.	3	Fair		
	5 p.m.	30	2	10	8	1	5	W.	2	Fair	0,042	
4	9 a.m.	30	2	10	6	2	4	W.	2	Fair		
	5 p.m.	30	1	11	0	2	1	W.	2	Fair		
5	9 a.m.	29	9	11	0	2	3	N. W.	3	Fair		
	5 p.m.	29	9	9	7	1	7	N. W.	2	Fair		
6	9 a.m.	29	9	9	8	2	1	N. W.	2	Fair	0,100	
	5 p.m.	29	8	10	0	1	9	W.	2	Fair		
7	9 a.m.	29	3	9	4	2	2	S. W.	3	Rain	0,072	
	5 p.m.	29	2	10	0	1	6	W.	2	Cloudy		
8	9 a.m.	29	2	8	9	2	0	N. W.	3	Fair		
	5 p.m.	29	4	9	1	1	7	N. W.	2	Cloudy	0,254	
9	9 a.m.	29	5	8	2	1	5	N. W.	2	Fair		
	5 p.m.	29	6	8	1	1	5	N. W.	2	Fair	0,050	
10	9 a.m.	29	7	8	4	1	6	N. W.	2	Cloudy		
	6 p.m.	29	7	8	0	2	4	N.	1	Snow		
11	9 a.m.	29	7	7	6	2	3	N.	1	Fair		
	6 p.m.	29	6	9	0	2	0	N. E.	1	Cloudy	0,151	
12	9 a.m.	29	7	8	8	2	6	S. E.	2	Rain		
	5 p.m.	29	8	9	7	2	5	S. E.	2	Cloudy		
13	9 a.m.	30	0	9	1	2	2	E.	2	Hazy	0,096	
	6 p.m.	29	9	9	0	2	3	E.	2	Hazy		
14	9 a.m.	29	8	9	0	2	1	S. E.	1	Hazy		
	5 p.m.	29	6	9	7	1	7	S. E.	2	Fair		
15	9 a.m.	29	5	8	9	1	8	S. E.	2	Hazy	0,194	
	5 p.m.	29	4	8	7	1	8	S.	2	Cloudy		
16	9 a.m.	29	1	8	5	2	5	S. E.	3	Snow	0,210	
	5 p.m.	29	1	9	4	2	6	S. E.	3	Rain		
											1,277	

D	Hour.	Baro.		Ther.		Hyg.		Wind.		Weather	Rain.
		In.	D.	In.	D.	I.	D.	Dir.	For.		
											1,277
17	9 a.m.	29	2	9	5	2	6	S. E.	1	Hazy	
	5 p.m.	29	2	9	4	2	5	S. E.	2	Rain	
18	9 a.m.	29	3	9	1	2	5	S. E.	3	Fair - - -	0,292
	6 p.m.	29	4	8	9	2	6	S. E.	2	Cloudy	
19	9 a.m.	29	4	9	2	2	2	N.	1	Fair	
	5 p.m.	29	4	8	9	2	0	N. E.	3	Hazy	
20	9 a.m.	29	3	7	6	3	8	N. E.	4	Snow	
	5 p.m.	29	3	8	3	4	0	E.	2	Cloudy	
21	9 a.m.	29	2	7	9	3	2	S. W.	2	Fair - -	0,520
	6 p.m.	29	1	7	4	2	5	S. W.	2	Fair	
22	9 a.m.	29	1	8	7	3	0	E.	2	Cloudy	
	5 p.m.	29	1	8	5	3	0	N.	2	Hazy	
23	9 a.m.	29	4	8	7	3	2	N.	2	Cloudy -	0,118
	5 p.m.	29	4	9	5	2	9	S. E.	2	Rain	
24	9 a.m.	29	3	9	6	3	1	S. E.	2	Rain - -	0,070
	5 p.m.	29	2	12	1	2	6	S. E.	2	Fair	
25	9 a.m.	29	3	11	3	2	8	S.	1	Fair	
	5 p.m.	29	4	12	5	1	8	S.	1	Fair - -	0,130
26	9 a.m.	29	4	10	3	3	9	E.	2	Mist	
	5 p.m.	29	3	10	3	3	4	E.	2	Mist - -	0,054
27	9 a.m.	29	4	11	3	3	5	S.	1	Fair	
	5 p.m.	29	4	12	4	2	3	S.	1	Cloudy	
28	9 a.m.	29	5	12	0	2	5	S. E.	1	Cloudy	
	5 p.m.	29	5	12	4	2	2	S. E.	2	Cloudy	
29	9 a.m.	29	6	11	0	3	0	E.	2	Hazy	
	5 p.m.	29	7	11	4	3	2	E.	2	Rain	
30	9 a.m.	29	9	10	5	2	8	E. b. N.	2	Cloudy	
	7 p.m.	29	9	10	2	2	9	E. b. N.	2	Fair	
31	9 a.m.	29	9	11	5	2	6	E. b. N.	0	Fair - -	0,177

H. at a Med.	29	6	9	9	2	4
Gr. Height	30	2	12	5	3	9
Least Height	29	1	7	4	1	5

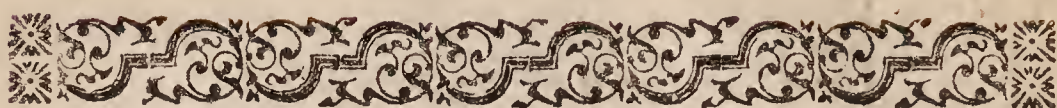
Total Depth 2,638

D.	Hour.	Baro.	Ther.	Hyg.	Wind.	Weather	Rain.
		In. D.	In. D.	I. D.	Dir. For.		In. D.
1	9 a. m.	29 9	11 2	2 2	9 N. E.	1 Mist	
	5 p. m.	29 9	12 6	2 2	6 N. E.	0 Mist	
2	9 a. m.	29 9	12 5	2 4	N.	1 Cloudy	
	7 p. m.	29 9	12 7	1 7	N.	0 Fair	
3	9 a. m.	30 0	12 0	1 8	N. W.	2 Fair	
	5 p. m.	30 0	13 0	1 7	N. W.	1 Cloudy	
4	9 a. m.	30 1	10 8	2 8	N.	0 Mist	
	7 p. m.	30 1	10 3	2 9	N.	2 Mist	
5	9 a. m.	30 1	12 7	1 8	N. E.	1 Mist	
	7 p. m.	30 1	12 7	1 8	N.	1 Fair	
6	8 a. m.	30 1	11 9	1 7	S. W.	1 Fair	
	7 p. m.	29 9	13 1	1 5	N.	1 Fair	
7	9 a. m.	29 9	11 6	1 8	S. W.	0 Fair	
	7 p. m.	29 8	11 8	1 5	S. W.	1 Fair	
8	9 a. m.	29 6	12 5	1 6	S.	2 Cloudy	
	7 p. m.	29 5	11 9	1 8	S. W.	1 Drizzling	
9	8 a. m.	29 6	11 9	1 8	W. b. S.	2 Fair	
	7 p. m.	29 6	11 8	1 4	W.	2 Fair	
10	8 a. m.	29 6	11 6	1 5	S. W.	3 Fair	
	7 p. m.	29 6	12 0	1 5	S. W.	1 Cloudy	
11	9 a. m.	29 6	11 6	1 6	S. W.	2 Fair - -	0,023
	7 p. m.	29 5	11 5	1 6	S.	2 Cloudy	
12	9 a. m.	29 5	12 2	1 7	S.	2 Cloudy	
	7 p. m.	29 5	11 7	1 7	S.	2 Cloudy	
13	9 a. m.	29 4	12 6	1 7	S. E.	1 Fair	
	7 p. m.	29 4	11 7	2 1	E.	1 Fog	
14	9 a. m.	29 4	11 8	2 3	S. E.	2 Cloudy -	0,055
	7 p. m.	29 6	11 0	1 9	S. E.	2 Cloudy	
15	9 a. m.	29 8	11 3	2 0	E.	1 Fair	
	7 p. m.	29 9	10 7	2 5	E.	2 Cloudy	
16	9 a. m.	30 0	10 8	3 0	N. E.	2 Fair	
	7 p. m.	30 0	10 6	2 4	N. E.	2 Fair	

D.	Hour.	Baro.		Ther.		Hyg		Wind.		Weather	Rain.	
		In.	D.	In.	D.	I.	D.	Dir.	For.			
											0,078	
17	9 a. m.	29	8	10	7	2	9	N. E.	3	Fog -	0,073	
	7 p. m.	29	7	11	0	2	7	N. E.	2	Fog		
18	9 a. m.	29	5	10	7	3	0	N. E.	2	Fog		
	7 p. m.	29	2	10	5	3	7	N. E.	3	Rain		
19	9 a. m.	29	3	11	2	3	4	S.	2	Cloudy -	0,187	
	7 p. m.	29	5	12	6	2	1	S.	1	Fair		
20	9 a. m.	29	7	12	2	2	3	S.	1	Cloudy		
	8 p. m.	29	8	12	4	2	1	W.	1	Rain		
21	9 a. m.	29	9	12	1	2	1	S. W.	1	Fair		
	8 p. m.	29	8	11	9	2	0	E.	1	Fair		
22	9 a. m.	29	8	11	4	2	0	E.	2	Fair		
	5 p. m.	29	8	11	9	2	1	E.	2	Cloudy		
23	9 a. m.	29	8	10	7	2	3	N. E.	2	Cloudy		
	7 p. m.	29	7	10	6	3	5	N. E.	3	Cloudy		
24	9 a. m.	29	7	10	4	2	6	N. E.	3	Cloudy	0,262	
	4 p. m.	29	8	10	8	2	0	N. E.	2	Fair		
25	9 a. m.	29	9	10	5	2	0	N. E.	2	Fair		
	5 p. m.	29	9	11	5	1	7	N. E.	2	Cloudy		
26	8 a. m.	29	9	10	4	1	8	N. E.	2	Fair - -	0,095	
	5 p. m.	29	9	11	1	1	6	N. E.	2	Fair		
27	9 a. m.	30	0	10	9	1	8	N.	2	Fair		
	5 p. m.	29	9	12	6	1	4	N.	1	Cloudy		
28	9 a. m.	30	0	10	9	2	0	N. E.	2	Cloudy		
	7 p. m.	30	1	11	4	2	0	N. E.	1	Cloudy		
29	8 a. m.	30	1	12	4	1	9	N. W.	2	Fair		
	5 p. m.	30	1	13	4	1	4	N. W.	2	Fair		
30	9 a. m.	30	2	11	7	1	6	E.	1	Cloudy -	0,123	
	8 p. m.	30	2	11	8	1	5	E.	1	Cloudy		
H. at a Med.		29	7	11	6	2	0	Total Depth				0,818
Great. Height		30	2	13	4	3	7					
Least Height		29	2	10	3	1	4					

D.	Hour.	Baro.		Ther.		Hyg.		Wind.		Weather	Rain. In. D.
		In.	D.	In.	D.	I.	D.	Dir.	For.		
1	9 a. m.	30	1	12	2	1	6	W.	1	Cloudy	
	5 p. m.	30	0	13	7	1	4	W.	2	Fair	
2	7 a. m.	29	9	12	6	1	6	W.	1	Fair	
	6 p. m.	29	8	12	8	1	5	E.	2	Cloudy	
3	9 a. m.	29	8	12	1	2	1	E.	2	Fair	
	5 p. m.	29	8	10	7	2	3	E.	2	Cloudy	
4	8 a. m.	29	9	11	4	1	5	E.	1	Fair	
	8 p. m.	29	9	11	1	1	5	E.	1	Fair	
5	9 a. m.	30	0	11	2	1	5	E.	1	Fair	
	8 p. m.	29	9	12	4	1	4	E.	1	Fair	
6	8 a. m.	29	9	11	2	1	6	E. b. N.	2	Fair	
	4 p. m.	29	8	13	0	1	4	E. b. N.	2	Fair	
7	8 a. m.	29	6	11	6	1	5	S. E.	1	Fair	
	5 p. m.	29	6	13	4	1	2	S. E.	2	Fair	
8	9 a. m.	29	6	10	7	1	4	N. E.	1	Cloudy	
	6 p. m.	29	6	12	3	1	3	N. E.	2	Cloudy	
9	8 a. m.	29	6	11	7	1	4	N. E.	2	Fair	
11	9 a. m.	29	7	12	9	1	3	E.	1	Fair	
	5 p. m.	29	7	13	4	1	4	E.	1	Fair	
12	9 a. m.	29	7	12	3	1	3	E.	1	Fair	
	5 p. m.	29	7	13	8	1	2	E.	1	Fair	
13	9 a. m.	29	8	12	8	1	4	E.	1	Fair	
	6 p. m.	29	9	13	1	1	3	N. E.	1	Fair	
14	9 a. m.	29	9	12	7	1	7	N. E.	1	Fair	
	6 p. m.	29	9	13	3	1	6	E.	2	Fair	
15	9 a. m.	30	0	12	5	1	6	E.	2	Fair	
	8 p. m.	30	0	12	9	1	3	E.	1	Fair	
16	9 a. m.	30	0	13	2	1	4	S. E.	1	Fair	
	6 p. m.	30	0	12	2	1	5	E.	1	Fair	

D.	Hour.	Baro.		Ther.		Hyg.		Wind.		Weather	Rain.		
		In.	D.	In.	D.	I,	D.	Dir.	For.		In.	D.	
17	9 a.m.	30	0	12	3	1	7	E.	1	Fair			
	6 p.m.	29	9	12	7	1	8	E.	1	Fair			
18	9 a.m.	29	9	12	4	2	2	E.	1	Rain			
	6 p.m.	29	9	12	9	1	8	E.	1	Cloudy			
19	9 a.m.	29	9	12	6	1	8	E.	1	Cloudy	0,032		
	6 p.m.	29	8	13	5	1	3	S. W.	0	Cloudy			
20	9 a.m.	29	8	13	3	1	6	W.	2	Cloudy			
	7 p.m.	29	8	12	8	1	4	W.	2	Cloudy			
21	8 a.m.	29	9	13	2	1	5	W.	2	Fair			
	7 p.m.	29	9	13	2	1	3	W.	2	Cloudy			
22	9 a.m.	29	9	13	2	1	9	W.	1	Cloudy			
	7 p.m.	29	9	14	0	1	1	W.	2	Fair			
23	9 a.m.	30	1	14	0	1	5	N. W.	2	Fair			
	8 p.m.	30	1	13	7	1	4	N.	2	Fair			
24	8 a.m.	30	1	12	5	1	6	E.	2	Fair			
	8 p.m.	30	1	12	0	1	7	E.	2	Cloudy			
25	9 a.m.	30	0	12	3	1	4	E. b. N.	2	Cloudy	0,045		
	8 p.m.	29	9	11	6	1	6	E. b. N.	2	Cloudy			
26	9 a.m.	29	9	12	0	2	5	N. E.	2	Cloudy			
	8 p.m.	30	1	12	2	2	5	N. E.	2	Cloudy			
27	9 a.m.	30	1	12	0	3	1	N. E.	2	Cloudy			
	7 p.m.	30	2	12	7	2	5	N. E.	2	Fair			
28	9 a.m.	30	1	13	8	2	0	N. E.	0	Fair			
	7 p.m.	30	0	15	9	1	1	N. E.	0	Fair			
29	9 a.m.	29	9	15	3	1	3	N.	1	Fair			
	9 p.m.	29	9	13	4	1	6	E.	1	Cloudy			
30	9 a.m.	29	8	12	9	1	3	E.	1	Fair	0,006		
	8 p.m.	29	8	12	8	1	3	E.	1	Fair			
31	9 a.m.	29	7	14	1	1	3	N. W.	2	Fair			
	8 p.m.	29	8	12	2	1	1	N.	2	Fair			
H. at a Med.		29	8	12	7	1	5	Total Depth					0,083
Gr. Height		30	2	15	9	3	1						
Least Height		29	9	10	7	1	1						



II. *An Account of the D I S E A S E S
that were most frequent last Year in E-
dinburgh.*

THE *Tertian Agues*, which were mentioned in the Close of our preceeding Year, continued likewise thro' JUNE, and Part of July 1732. Towards the End of June this Disease did not form into regular Paroxysms, and perfect Intermissions, but appeared more in the Shape of a remitting Fever. During the Remissions, the Pulse was much sunk, but as the Sweat came on, the Pulse became fuller and stronger. When the Sweat did not break out, the Patients became delirious, and some continued quite deaf for some Days. The Urine was pale, and without Sediment 'till the Disease was going off.

Some were cured of this Disease after two or three Paroxysms, by a Vomit or two, but with others the Disease lasted much longer. Bleeding was not found of Use, altho' some Symptoms seemed to require it, but Vomiting and Blistering succeeded much better, either of them bringing

ing out the Sweat when untimely stopt or prevented.

In JULY some few *Tertian Agues* remained; they were then more regular and gentle than before. Towards the End of this Month the *Cholera* began to appear; but it was neither very frequent nor violent.

In AUGUST many among the poorer sort of People in the Suburbs and Villages near *Edinburgh*, were taken with slow Fevers, generally attended with a violent Headach and Ravings; some with a *Diarrhæa*, others with Pains of the *Rheumatick* kind all over the Body. As few of the Sick had Access to timely Assistance, several died in this Distemper.

The same Fever continued among the poorer People through SEPTEMBER and OCTOBER, and prov'd mortal the eighth or ninth Day. Besides the Symptoms before mentioned, many complained of great Weight of their Heads, and Drowsiness, Loathing and Vomiting; others had Pains of the Breast, and difficult Breathing. Children in this Fever, beside the Headach and Drowsiness, had Pain and tense swelling of the Belly. Most of them passed Worms, some the *Teretes* others the *Ascarides*, and recovered.

In

In NOVEMBER several Children were seized with slight aguish Fits returning every other Day, but lasting only a few Hours, and going off without Sweating. Between the Paroxysms the Children were pretty easy, and their Pulses calm. These Fits were easily carried off by a Vomit or two.

About the same Time several People were taken with a *Cholera*, which did not prove very obstinate.

In this Month likewise the Effects of Cold appeared in different Shapes, as *Coughs*, *Quincys*, *Rheumatick Pains*, *Colick Pains*, *Diarrhæas*, &c.

From the Beginning, till the middle of DECEMBER, slow Fevers were very rife among young People; they continued long, and were attended with Pains in the Breast, and symptomatick *Diarrhæa*, but were not deadly. About the same Time others were seized with Fevers of the nervous kind, with a very frequent but low Pulse.

On the 17th *December*, several People were suddenly attacked with *Fevers of Cold*; the Numbers increased but insensibly, till the 25th; after which these Fevers became greatly epidemick, very few escaping them, and continued universal in this City
and

and Neighbourhood till the middle of JANUARY 1733, when they began to decrease, and diminish'd daily till the End of that Month.

This Fever began with a Coldness, Shivering, Swimming of the Head, Pains of the Head, Breast and Back; the Pulse was very frequent; the Appetite quite lost, and remained pall'd sometime after the Disease was removed. With a great many it began with a running of Lymph at the Eyes and Nose, which continued for a Day; then they complained of Pain and Swelling about their Throats before the Cough began, and not a few were suddenly seized with the Cough, which, after the third Day, was incessant and constant in all, by which they discharged great Quantities of *Mucus*, and had their Pains greatly increased. Some complained of sharp Pains in their Bellies, and had a *Diarrhæa*, sometimes with bloody Stools, especially if they were not sufficiently blooded in the Beginning. Several passed their Urine in very small Quantity, of a high Colour, without Sediment, and continued to do so, sometime after the Fever was gone off. Among the Children, along with the Cough, many had violent Vomitings, and some a gentle *Diarrhæa*, which carried off the Disease.

The

The Fever commonly left the Sick in two or three Days; but after the third Day scarce any escaped the constant tickling Cough. Generally all of them inclined to sweat, and were thereby considerably relieved. Some had profuse Sweats, with copious reddish or brown, but not lateritious Sediment in their Urine, without any previous Coldness, Shiverings, &c. These soon did well, if the Sweating was not discouraged by some other Evacuation.

Bleeding in the Beginning gave Relief to the Pains, and weakned the Fever, and required to be plentiful to many who had violent Headaches, and a Feeling in their Eyes as if they would have started out, or to those who had an universal Oppression of the *Thorax*, with Stitches and Cramps of the Muscles employed in Breathing; such in this Condition who delayed Venæsection too long, were seized with a *Hæmoptoe*. Some bled a little at the Nose, and were quickly well, without any Medicine or other Evacuation. A few were at once seized with ugly Faintings; when bled they recovered more slowly; but when supported with Cordials, they were soon well.

Vesicatories were of Service to the Cough, and Opiates were of great Use, curing several.

When

When the Phlegm began to thicken Mixtures in which *Gum Ammoniac* and *Oxymel Scilliticum* were the principal Ingredients, opened the Belly, and did remarkable Service. The ordinary *Pectorals* and *Balsamics* were not observed to do any good.

This Disease was not of itself mortal, but it swept away a great Number of poor old and consumptive People, and of those who were much wasted by other Distempers. As a Proof on whom it fell heaviest, we may remark, That though the Number of Burials in the *Gray-friars Church-yard*, (where all the Dead of *Edinburgh* are buried) was double of what it uses to be in the Month of *January*, yet the Number of those who were buried at the publick Charge was so great, that the Fees of the Burials scarce did amount to the Sum commonly received in any other Month.

It was very remarkable, That, notwithstanding this Disease was so universal here, the People in our Prison, and the Boys who are numerous in *Heriot's Hospital*, which is contiguous to the West Side of the *Gray-friars Church-yard*, and the Inhabitants of the Houses near to that Hospital escaped this Fever and Cough.

This epidemick Disease which was felt sooner at *Edinburgh* than any other Part of
this

this Island, spread it self gradually over all *Scotland*. It did not reach the most Northern and Western Parts till about fifteen Days after the Time above mentioned of its attacking this City. The Ship *Anne and Agnes*, *David Littlejohn* Master, having made a Voyage to *Holland*, with one sick Sailor on Board, returned with the other ten in perfect good Health, till they made *Flamborough-head*, where on the 15th of *January*, six Sailors were taken ill; next Day two more were in the same Condition, and the Day thereafter one more fell sick; so that when the Vessel came to the Road of *Leith*, none on Board were in Health except one, who was seized the Day after he came on Shore with the same Disease which his Comrades had, whose Symptoms were the common ones of the raging epidemick Distemper.

We believe it will not be improper here to mention the Horses in and about this Place, being universally attacked with a running of the Nose and Coughs towards the End of *October* and beginning of *November*, before the Appearance of this Fever of Cold among Men.

This epidemick Distemper above described, spread it self over all *Europe*, and also infested the Inhabitants of *America*; so that

that it was perhaps the most universal Disease upon Record. The first Accounts we have of any Thing like it this last Year in *Europe*, was, in the Middle of *November*, from *Saxony*, *Hanover*, and other neighbouring Countries in *Germany*. It raged at one Time in *Edinburgh*, and *Basil* in *Switzerland*. It appeared in *London* and *Flanders* after the first Week in *January*. Toward the middle of which it reached *Paris*; and about the End of the same Month *Ireland* began to suffer. In the middle of *February*, *Leghorn* was attacked; and near the End of it, the People of *Naples* and *Madrid* were seized with it. In *America* it began in *New-England* about the middle of *October*, and travelled Southward to *Barbadoes*, *Jamaica*, *Peru* and *Mexico*, much at the same Rate as it did in *Europe*.

There were also some People in *Edinburgh* labouring under Fevers of the *Pleuritick* kind, and others under slow tedious ones in the Month of *January*.

IN FEBRUARY *Rheumatick* and *Pleuritick* Fevers succeeded to the Colds, several who had passed through these were seized with those and died. The Management of the Sick was no other than what is common in *Pleurisies*.

About this Time also several People died suddenly.

The *Pleuritick* or *Peripneumonick* Fevers which began in *February*, continued through all *MARCH*.

At the same Time slow Fevers were likewise frequent without any topical Inflammation. In most Patients these Fevers did not appear with any violent Symptoms, tho' some had Ravings, but they were neither constant nor high. These Fevers often lasted till the 30th or 40th Day, and in some to the 60th; and at length the Patients gradually wrestled out of them, without any remarkable *Crisis*. The common Remedies in such Cases availed little here; Blistering was found of much more Service than Bleeding.

Tertian Agues, began to appear in *March*, and continued through *April* and Part of *May*, tho' not very frequent; many of them went off easily after four or five Fits, without much Assistance from Medicine, others took the common Course.

Some short but sharp Fevers were frequent in *APRIL*, with an *Erysipelas* for the most Part on the Face, and sometimes on the Body or Extremities.

Some few Children had the *Small Pox* all the Spring, and there were rather more
in

in MAY, they were generally of the distinct kind; and several had an Eruption like the Bastard or *Chicken-Pox*. It was attended with very little Fever, and very slight Symptoms; for after a little Heaviness and Loss of Appetite, the Pustules appeared. They were pretty large and red: They did not suppurate, but had a little Vesicle of clear Lymph on the Top. Some new Pustules appeared for four or five Days successively like the first; and about the ninth Day all went off.



III. *Extract from the publick Register of Burials in Edinburgh.*

1732:	Men.	Women.	Child.	Still-born.	Sum.
June - -	23	32	27	0	82
July - -	16	21	37	5	79
August - -	19	20	39	2	80
September	15	32	20	4	71
October	20	19	32	4	75
November	24	28	33	4	89
December	31	41	34	3	109
1733.					
January	56	81	74	3	214
February	40	44	48	3	135
March -	36	42	34	5	117
April - -	20	28	41	2	91
May - -	19	26	57	3	105
Total	319	414	476	38	1247



IV. *An Essay on penetrating topic Medicines* by John Armstrong M. D. *.

IT does not seem strange that Medicines should, according to their various Powers, affect the Solids and Fluids to which they are immediately applyed. Neither is it hard to conceive by what Means such Particles as are capable to enter the absorbent Vessels, should reach any Part of the humane Body that lies (as all its Parts in a sound State do) in the Road of the Circulation. But by what secret Ways external Medicines are immediately communicated to the remoter Substance of the Parts to which they are applied, and how by that Means they contribute to remove Diseases that have for their Seats the Ligaments of the Bones, or such other Parts as seem not to be accessible from without, is an Enquiry that seems to have been hitherto pretty much neglected. 'Tis a very common Way of talking upon this Subject, That this or that Medicine penetrates the Pores

* This Scots Gentleman is the Author of the Dissertation, *De Tabe purulenta*, published 4. February 1732.

Pores; but I am not so certain that the Ideas commonly joined to such Expressions are very distinct: For no Writer of my Acquaintance that has handled this Subject, has taken the Pains to explain himself so far as to tell us what Pores he means, which has induced me to venture the laying before you a few Conjectures concerning the Ways by which topical Medicines are conveyed into the Substance of the Parts to which they are applied, directing my principal Aim to the Consideration of those that tend to the resolving of Obstructions of the remoter Vessels.

I need not here enter into any Disquisition concerning the Nature and Seat of Obstructions, nor from thence explain the Indications of relaxing the obstructed small Arteries, and of attenuating the obstructing Matter. This is what may be learned in several Books, and is most methodically treated in that elegant Chapter of *Boerhaave's Aphorisms de Obstruct.* Allow me only to mention, That the Medicines of which I now treat are such, as by the Smallness and Mobility of their Particles, attended for the most Part with a gentle Acrimony, are able to make their Way into the Substance of the Parts to which they are applied, without eroding or wounding any of the

Solids, and thence are justly enough named *penetrating Topicks*.

That the Effects of such Medicines are not owing to the Particles of them, which enter into the Orifices of the absorbent Veins that are every where on the Surface of the Body, seems to me plain from their not being applied, on this Supposition, to the obstructing Matter, till they have been mixed with all the Mass of Blood; and therefore an exceeding small Proportion of them can ever arrive at the obstructed Arteries; besides, if this was the Case, these Medicines would have as great, if not greater Effects when applied to the sound Parts of the Body, than to the diseased Part, which daily Experience shows they have not.

I can as little allow all the Effect of these Medicines to depend on their opening the Orifices of the exhalant Vessels on the Surface of the Body, which some might suppose always obstructed when the more internal ones are blocked up; and therefore would alledge that the Fluids having regained their Passage by the exterior Vessels, will exert a less *Momentum* on the Interior, the Obstruction of which comes consequently to be resolved. I cannot, I say, allow this Account to be just, because by other Medicines, the Emollients for Instance, the Ob-

Obstruction of the exterior Vessels can be equally well removed; but these have not the Power of resolving deep-seated Obstructions, which they would have equally with the Class of Medicines of which I treat, if the above Reasoning was just.

Nor can I imagine the subtile Particles of the *peretrating Topicks* capable of forcing their Way through the Coats of numerous Vessels, where we can scarce suppose Pores by which they should pass, without Hazard of the finer Particles of our Fluids escaping out at the same Passages by which the Medicines entred, which would produce a great Train of bad Consequences.

Previous to my Opinion of this Matter, it will be necessary to observe, That tho' the small Arteries of the Body cannot admit any thing at their small Extremities to pass backwards towards their larger Trunks, as long as the Force of Circulation continues to propel the Liquors towards their Extremities; yet when that propelling Force does not act, they will, like other empty Tubes, admit Substances at either Extremity; and wherever they are small enough, they will exert the same Power of raising Liquors in them, as other capillary Tubes do. Besides, what Reason dictates to us in Proof of this, we have it fine-

ly illustrated and confirmed by Mr. *Hales's* Experiments of the Motion of the Sap or Juices imbibed at either Extremity of Vegetables.

I imagine therefore, that subtile Medicines are conveyed by the exhalant Vessels of the Skin, to those Parts of the smaller Arteries, where the Circulation is choaked by Obstruction, which I conceive to be thus accomplished. The Places where the arterious Vessels are most liable to be obstructed, are where they are straitest; that is, where they are about to join their analogous Veins; and the smaller any Branch of an Artery is, the more subject it is, *cæteris paribus*, to obstruction. It does not seem improbable then, that the Branches of Arteries, distributed to the more solid Parts, immediately before they deliver their Contents to their corresponding Veins, send off an exhalant Vessel to the Skin, by which a Separation is made of the most acrid exalted Parts of their Fluids, which hitherto may have been useful by their inciding Acrimony, to promote a free Passage through these dangerous Straits; but by acquiring still a greater Sharpness, would be noxious in another Circulation. This I presume is agreeable enough to the most approved Theory of Obstruction, Secretion and Perspiration.

Now,

Now, suppose an Obstruction formed in such a small Artery, above the Place where it detaches its exhalant Branch; here is a stop put to the Progress of the Fluids thro' this Vessel, its perispiratory Duct becomes empty; and for this Time it is as pervious from without, as an absorbent Vein: Thus it may admit, as far as the obstructed Point, the smaller Particles of Applications, whether such as are properly called penetrating or emollient, by whose attenuating, stimulating, and relaxing Powers, the obstructed Matter is at last resolved and loosened, and the damm'd up Fluids following with a great Gush, partly return by the Vein, and partly make their Exit by the Excretory Tube. Thus when a great Number of small Arteries, neighbouring one another, are obstructed and wedged close together, as soon as a few of them are, by the Means above-mentioncd, unlocked, the rest will crowd each other less, and will be more at Liberty to yield to the Force of the urgent Stream: So that by this increased Laxity, and the continued and repeated Application of the same resolving Powers, the whole bulk of obstructed Vessels is by Degrees opened.

After the same Manner, when some of the larger Kinds of Arteries are obstructed, the
more

subtile Particles of external Medicines may be conceived to gain Access, by a great Number of Conduits, to the Places where the Obstruction is formed, if betwixt these Points and the Rise of the exhalant Vessels, they have no Anastomoses with other Branches. And perhaps these mutual Communications are not so frequent in the capillary Vessels as some give out. This is confirmed by Mr. *Hales Hæmast. Exper. IX.*

This Doctrine may perhaps receive some Illustration from some *Phænomena* that ordinarily attend several topical Diseases, particularly the Gout, whose *causa proxima* is, according to the most plausible Accounts, an Obstruction of the small arterious Vessels distributed to the Ligaments of the Bones, the Tendons and their Ligaments. 'Tis well known, that all the Time this Disease exerts its Rage, the Skin of the Parts affected is remarkably dry, which no doubt is owing to the diminished Perspiration; and this Dryness happens when the Pain is not attended with any Tumor, and therefore cannot be imputed to any Compression made upon the perspiratory Ducts. But as soon as the broken *Lentor* begins to thaw from some of the Vessels, the Skin of the Part is seized with a keen itching, from the morbid Matter, grown acrid by a long
Stagna-

Stagnation and Attrition, rushing through the Vessels of Perspiration contracted to their least Capacity, till at last this same Matter, together with that sharp thin Fluid which naturally is discharged this Way, pouring into these Vessels in greater Quantities, dilates them more and more and drills out in Form of Sweat, while the cuticular Scales dried and shrunk for having been so long deprived of Moisture, fall off in great Abundance.

But besides this, there is perhaps still another Way by which external Medicines are conveyed to the more distant Vessels; that is, by insinuating themselves between the Interstices of the Canals. And though in this Way they cannot, according to our Hypothesis, act immediately on the stagnant Fluids, except such as are extravasated, yet they may be conceived as effectually to stimulate or relax the obstructed Vessels, as those that enter their Cavities.

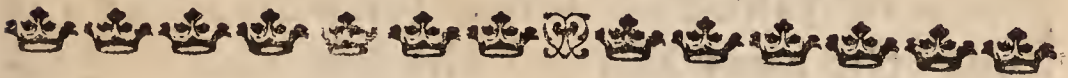
Tho' I said before, (and gave a Reason for saying) that it did not seem very probable, that the Particles of Medicines, however subtile, could penetrate through the Coats of the Blood-vessels into their Cavities; yet it is not, as I apprehend, inconsistent with this Opinion, to allow their finding a Passage through that rarer Texture of small Vessels

Vessels, which fills up the Interstices of the larger ones, and connects them loosely together: For it does not appear that these Tubes, which do not conspire to the forming of a larger Vessel, are so closely twisted together, as the *Vasa vasorum* or those that do: And that the Substance of our Bodies is really pervious enough to transmit the more subtile Particles of Fluids that are applied to them, appears *ad oculum* in the humane Body, since that Part of the Intestines upon which the *Vesica Biliaria* lies, is always found tinged with Bile filtered through the Coats of that tenacious Membrane.

I know not how else the whole Substance of a rigid contracted Part, comes to be softened and relaxed by emollient Steams, Fomentations or Cataplasms; or by what other Way of Communication, we can account for the Effects of some Medicines, that, externally applied to the Abdomen, prove emetick, cathartick, antemetick, anthelmintick, &c. as well as when taken inwardly, or for the Success of proper Fomentations, &c. applied to the Loins in some Diseases of the Kidneys; or of resolvent Applications in discussing occult Tumors of the Glands.

Medicines may perhaps by both the proposed

posed Ways reach the obstructed Vessels of the more solid Parts, whether Resolvents or Palliatives of the stupifying anodyne kind. Though considering in what liberal Quantities these last are used externally, and how small a Dose is sufficient to mitigate Pain, or even to cause Sleep, when inwardly taken, the absorbent Vessels may take up as much of these as is sufficient to answer for their Effects.



V. *REMARKS on the external Use of Tobacco and Groundsel; and on the Effects of Oil of Turpentine given internally, by Mr. JOHN STEDMAN Surgeon at Kinross.*

YOUR Proposals inviting People to communicate any uncommon Effects of Medicines which they have observed, I presume to lay before you what I have seen performed by two very common Drugs, but is not so generally at least remarked by the Writers on the *Materia Medica*; and to these shall subjoin a Caution necessary in the Use of another Medicine.

Tobacco beat well with Vinegar or Brandy into a Mash, and applied in a Linnen Rag

Rag on the Stomach, occasions strong vomiting, and has sometimes very good Effects in removing hard Tumors of the *Hypochondria*; I know two Instances of its making a compleat Cure: One is, of an old Man, who, by sleeping in the open Air while the *Serenadas* or Night-dews fell, was taken in the *West Indies* with a Numbness of his whole Body, which soon was followed with purging and vomiting; and these going off, he had all the Symptoms of Jaundice, with Hardness and Pain under the short Ribs of the left Side: The Pain went off in a few Days, but the Tumor increased. After he had used Variety of Medicines for five Years to remove this Disease, a Sea Surgeon applied a Pultice of *Tobacco* disguised with Green Tea, Sugar and Cochineal, upon the *Epigastrium* and *Hypochondria*; after this Application had been made four or five Hours he vomited a great deal of purulent Matter: When the Pultice was taken away the Vomiting ceased. He continued to apply this Mash once a Day for a Month, and was perfectly cured. The other Example is of a Boy, fourteen Years old, who was cured much in the same manner of a hard indolent Tumor of the left *Hypochonder*.

The Man had six Ounces of *Tobacco* in his

his Pultice, the Boy had only one ; and the Quantity must always be regulated by the Age of the Patient.

I had been informed of a young Man at *Edinburgh*, who was famous among the lower sort of People for curing Agues with an external Application ; and I had several well vouched Stories of his Success : This made me curious to discover what his Secret was. I therefore procured some of the Pultice which he applied to the Pits of the Patients Stomachs ; it proved no other than recent *Erigerum* or *Groundsel* beat down into a very coarse Pulp, with some other Herbs which I believed were put in only to conceal it ; for since I came here, I have used the *Groundsel* alone with very good Success. It is applied cold, and causes strong vomiting some Hours after it is applied, which is only done on the Days free from the Paroxysm.

Ætherial Oil of Turpentine is frequently taken in Honey, or mixed with some Liquor, by People labouring under the Sciatick and Rheumatick Pains ; and the Patients sometimes are very careless in measuring out their Dose, which ought to be small at first, and to be very gradually increased,

cess and Defect computed, there may be reckoned at least one for every Parish.

The Soils out of which these mineral Springs rise are various: That near to *Aberbrothock* is in the ordinary purer sort of the Soil of this Country, the upper *Stratum* being a gravelly Clay, below which there is another of Pebble Stones intermixed with Sand; under this there is Sand and Gravel mixed. The Well is in the lower Part of a Den or hollow Ground, having a Rivulet running by at the Distance of about fifty or sixty Paces. The Side of the Rivulet opposite to the Well is bounded by a gravelly Rock, betwixt the Layers whereof there ouzes clear Water dropping over Sleeks (*a*) suspended thereat; and at the Top of the Rock there is a small Well of good Fountain Water. I evaporated the Water from these Sleeks by the Heat of the Sun, and nothing remained but a gray Powder, as of ordinary Clay. About three or four hundred Paces above the Well, and on the same Side of the Rivulet there is another Spring of common Water; but there are no more Rocks near or above the Well for a considerable Way. The Soil of most other Spaws which I have

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(a) A smooth shining Clay.

examined is much the same with that of *Aberbrothock*, and generally a Rivulet runs also near them through common Flintstone and Sand ; particularly, this is the Case of the Well of *Kincairdin*, which is esteemed in this Country next to *Aberbrothock* : And I am informed by good Hands, that the Soil of the mineral Well at *Peterhead*, at the Mouth of the *Murray Firth*, is much the same, without any Rocks in its Neighbourhood, except the Sea Rocks, to which it is so near, that it is overflowed by high Tides.

There are only three *Spas* that I know hereabouts, the Soil whereof varies from what I have just now described ; one of these is in *Glendy*, beyond the fam'd *Kairn*, on the Top of the *Grampians* : The Soil of this Well is Bog, with Moss-ground round it ; and no Rock is to be seen near it. This Spring bubbles up between the Moss and the Gravel at its Bottom, playing, as it issues out, like a Pot boiling, and appears of the Colour of *Oker*, with which one's Shoes also are coloured when he treads on the Moss near the Well. I have seen another situated in a like Soil in *Lentretham*, near to the Mouth of *Glenisla* ; but it does not bubble up as the former does,

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The only *Spaw* of my Acquaintance, that hath any thing of Rock uncommon in its Neighbourhood, is near to *Cortachie*, my Lord *Airly's* Seat on the Water of *South-Esk*: This mineral Fountain is situated at the Foot of a Hill near to the River, having, at the Distance of forty or fifty Paces, a good many rocky Stones, which shine or sparkle like *Marcasites* when they are broken; and Pearls are fished in the neighbouring River. I have sent some of these Stones for your Examination; but they are not so bright or shining, and of such a polished Surface, as others which I have seen on the other Side of that Ridge of the *Grampians* in *Glenisla*.

After considering the Soils from which these *Steel Spaws* rise, and all in their Neighbourhood, I would think that the most probable Account which can be made of their mineral Origins may be taken from the Discoveries of Mr. *Geoffroy*, and of Mr. *Lemery* the Son, compared (a). *Geoffroy*, after attempting to make Iron with the Clay of Brick and Linseed-oil, found, by some such Experiments, that there was Iron in all Vegetables which he could put under Trial; for all of them had

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(a) Memoires de l'Acad. des Sciences, 1704, 1705, 1706.

Particles, which the Loadstone, or Needle touched with it, attracted. And Mr. *Le-mery*, by exposing Vegetables to the Burning-glass, fus'd them into a metallick Mass, in the same manner as was done to Filings of Iron; and from hence takes Occasion ingeniously to account for this Mineral's ascending, its Gravity notwithstanding, through the whole *Compages* of Vegetables: Which he illustrated and confirmed still further, by his Experiment on Iron dissolved, first by Spirit of Nitre, and then by Oil of Tartar, when it *arbores* all over the Surface of the Vessel in a great Variety of Branches. What I aim at may still be more easily conceived from what *Le Givre*, a Man of good Sense and Learning of his Time, writes concerning the medical Wells of *Provence*, to wit, That in Trenches digged for discovering the Origins of these Wells, and on the Sides of the neighbouring Ditches, he found the mineral Fluid drilling through its small Conduits, and becoming of the Consistence of the Dreg of Oil: And then he tells us the various Colours it assumes in Analogy to *Crocus Martis*, and describes its different Degrees of Consistence and Solidity, according to its being more or less exposed to the Air. It is probable that the like Discoveries in several

veral other Parts of *France* induced *Lemery* to say, that *France* abounds in Iron every where ; for I believe we have not otherwise heard of Mines of Iron being every where in that Country. So that our medical Wells may bear a just Analogy to their mineral Progeny of Vegetables, if such new Phrase of Language may be allowed ; and I think the Volatility of our *Spaws*, discovered both by the Experiments made with them, and by their medical Effects, of which hereafter, may hence be best accounted for. Nor needs what I have here argued for be thought surprising, since the best Philosophy hath proved the primægenial Earth, compared with it as at present, to have been of a more liquid Consistence. And Mr. *Boyle* and Mons. *Tournefort* have discovered the same of Gems, Marbles and Corals.

Whatever Truth is in this Doctrine, Mr. *Geoffroy* and *Lemery*'s Experiments lead us to understand why *Steel Spaws* are so frequent ; and really considering how much the Mineral is diffused over all, one would think that all Waters should be impregnated with it ; and possibly they may be so, only the Proportion of the Mineral is so small in most Fountains, that the common Trials will not discover it.

I could find no Difference in the specifick Gravity of the *Steel Waters* I tried from that of common Fountain Water.

The fixed mineral Contents of the *Steel Waters* of *Aberbrothock* and *Peterhead* may be collected much more easily than is done in the common Method of evaporating the whole Water, if the mineral Water is put in open Bottles some Days; for then its Contents precipitate, and the Water being poured off, will let fall any Remains of the Mineral, by affusing common Fountain Water: And the Precipitations may be hastned, by mixing any proper Adstringent. The mineral Substances thus collected, are afterwards to be dried in the Shade, Sun, or a nalogous Heat of *Fire*. In this manner they will be got more intire, than when such a strong Heat is employed as is necessary in boiling, which may force off the more volatile Substances.

After four *Scottish* Pints of *Aberbrothock* Water were evaporated leifurely at the Well, there was no Appearance of a Pellicule, and the dried Powder that remained weighed, as near as an Accident of losing a little of it would allow me to judge, between fifteen and twenty Grains; this I threw into a hot Iron Ladle, when it sparkled

led into little *Flammules*, just as the fine Filings of Iron use to do : But the Powder of the Sleeks of the Well sparkled but faintly when so tried.

Monf. *du Clo*'s Experiments satisfy me, as they did him, that it is not easy to determine what Salts these Waters contain, or whether all are impregnated with the same kinds of Salts : He could find neither *Allum* nor *Vitriol* in any of the *French* Wells ; only in one he found some Resemblance of the latter ; all the other Wells gave a Salt, answering to a Composition of *Nitre* and *Sea Salt* mixed in various Proportions ; which probably is the natural Salt of the Earth discovered by Mr. *Tournefort* (a), resembling in most Trials the *Nitrum* of the *Levant*, being neither acid nor alkali, but approaching most to the latter.

The *Gall*, *Myrobalan* and *Granat* Bark were chiefly used by *du Clos*, to discover the *Steel Spaws* of *France*, and to determine the greater or lesser Degrees of the mineral Contents, by the higher or lower Tincture which they made when mixed with the mineral *Steel Waters* : Which Trials have also answered very well with

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(a) Preface to his History of Plants in the Neighbourhood of Paris.

me ; only, seeing the *Myrobalans* give a reddish Tincture to ordinary Water, and observing the mineral Waters going upon the same Colour when I used them, I have chose to make my Trials with the *Gall*, and employed either the Shell intire, or its Tincture, because the Powder or its Infusion generally makes the Water muddy. Having therefore affused the same Quantity of *Peterhead* and *Aberbrothock* Waters on like Quantities of *Gall*, the *Peterhead* Water struck a deep purple Colour, and the *Aberbrothock* Water became only dilutely red, as a *Vin paillé* ; then I added by Degrees double the Quantity of common Fountain Water to the *Peterhead* Water tinctured with the *Gall*, before it became precisely like to the Colour of the *Aberbrothock* Water with the *Gall* in it : Whereby we may see that the mineral, as reached by the *Gall*, is two thirds stronger in the *Peterhead* than in the *Aberbrothock* Water. The Water of *Glendy* came nearest to the *Peterhead* Well in its deep Tincture ; next to this was the Water of *Kincardin* : Most of the other Spaws that I have examined give a Tincture much like that of *Aberbrothock* ; some, a little higher ; others, somewhat lower.

The Infusion of the Slicks gathered from
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the Stones wherewith the Well of *Aberbrothock* is encompassed on the Sides, and covered above, made with Water or Vinegar, struck a strong coloured Tincture when Galls were mixed with it.

Rectified Spirit of Wine makes no Change on the *Steel Waters*; but when the Gall is afterwards added, the Tincture is higher than when no Spirit is used. The common Spirit of Wine mixed with the mineral Water, turns it of a fine light Violet Colour; and when the Gall is added, the Tincture becomes more dusky than by the Gall alone: Whether is it not probable, that the rectified Spirit exalts the Sulphur, or other active Principles partaking of the Nature of Sulphur, without making any Tincture, but only augmenting that given by the Gall? whereas the common Spirit gives a Tincture, which being confounded with that of the Gall, forms that dusky Colour.

Our *Steel Spaws* which I have tried, appear to be so very volatile, that by the least Access of Air after they are taken up from the Well, all that bears Trial in them goes off, especially if they are taken up in a hot Sun; you will better comprehend this, when I tell you, that lately I caused two Bottles of *Aberbrothock* Water to be taken up in my Sight,
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and to be immediately well cork'd and rosin'd: Next Day, the first of them I put under Trial answered scarce more than ordinary Fountain Water; but the other answered in the ordinary Manner. The only Reason I could find for this was, the cracking of the Rosin, and Roughness of the Neck of the Bottle, which hindred the Cork to apply so close to the Bottle in which the first Water was contained: This taught me to believe I had not been formerly abused, as I suspected, when I found this and some other Waters brought me to have a sensibly vapid Taste, and to contain nothing of the Mineral; though I must tell you, that when I formerly had *Aberbrothock* Water under Examination, and did not use so much Precaution as lately, I did not meet with such Disappointments; which I can attribute to nothing but the Difference of the Seasons, the Water being taken up for my late Trials in very hot Weather.

As I found the *Liege* and *Piermont* *Spaws* giving the same Tincture with Galls, and agreeing every other Way, the vinous Flavour peculiar to these foreign Waters only distinguishing them, so I have seen these also faint of Taste, and refusing the usual

usual Trials, on occasion of being ill cork'd or rosin'd.

I come now to consider the medical Uses of these Springs. As they evacuate mostly by Urine, but rarely by Stool, and only in the more lax and flabby Texture of the Bowels, I have found them, especially that of *Aberbrothock*, good in nephritick Diseases, scouring off Gravel, and sometimes pushing a Stone down. They are beneficial in scorbutic Foulnesses, especially when the Humours are in an aciscent Disposition; in all Diseases of the Stomach depending on an Acid; and in general, they are serviceable, and may be used more freely in all Indispositions, occasioned by what Physicians call a morbid Acid in the Body; but where the alkaline or bilious Disposition prevails, they are to be more sparingly, if at all, taken. And as Observation hath evicted the Distinction of such opposite Causes of Diseases, so the Trial by Galls, their turning Syrup of Violets, Tincture of Roses, &c. green, discover the Alkali in them; which might have undeceived Men from being so fond of denominating them so generally *Acidulæ*.

My Experience in the Cure of Diseases by these Waters, will not allow me to state universally their comparative Vertues on
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the higher or lower Degree of Tincture from the Mixture of other Substances with them; for I cannot say whether the deeper Colour of *Peterhead* Water with Galls, depends on a greater Quantity of the same mineral Sulphur, or on a firmer Combination with its Earth; or whether they may not contain a grosser Sulphur, or a larger Proportion of Earth than is in *Aberbrothock* Waters. All I can hitherto determine by Observation is, That in Flaccidness, and too great Relaxation of the Solids, especially of the Stomach and other chylopoietic Organs, the *Peterhead* Water has by far the Preeminence: As on the other Hand I have found the Use of the *Aberbrothock* Water of singular Advantage, in lowness of Spirits and other Maladies, where the Nerves are said to be affected; for which I have also seen the *Kincairdin* Water beneficial.

One of our Burghers, about thirty Years of Age, of a clean and healthy Constitution, having met with stormy Weather at Sea, fed on salt Meat, and having bad Success otherwise in a Voyage, returned scorbutick, emaciated, enervated in all the digestive Powers, low spirited, and so extremely feeble, that he could walk or sit on Horseback with Difficulty. After
drink.

drinking *Aberbrothock* Water at the Fountain a few Days, he walked about with ease, and with much more Vigour.

A Gentleman of Honour, aged sixty, of a vigorous Body, and who had enjoyed good Health impair'd at Times by good Fellowship, from an Inability to walk without Supports, recovered Ability to walk with Ease by the same Means in a few Days: And he received the same Benefit in a greater or lesser Degree for several Years, in which he used that Mineral Water.

A Lady in a declining Age, having had Uneasiness in her Mind, and becoming otherwise of infirm Health, every accidental Disorder was accompanied with a notable sinking of Spirits. After various Medicines that seemed at Times to gain on the Distemper, which always however returned rather worse; and the Lowness of Spirits still attacking her less or more, she drank the *Aberbrothock* Water at her own House in the Spring: The Water was always taken up at Night, and kept fresh two or three Days, and then was renewed. She continued the Use of it a Month, with some little Intervals, and thereby recovered both Health and Spirits.

A Gentleman having suffered an aguish Indisposition several Years, it shifted at last into

into low Spirits to a great Degree; which he recovered in good Measure, by taking to a low Diet. When his Symptoms return, as they often do, the *Liege* and *Piermont Spaws* and *Aberbrothock* Water in its Season are of good Use to him; frequently he prefers the last to the others, tho' it is brought farther and longer kept than in the former Case.

I have mentioned these two Cases to show that notwithstanding the Virtue of the Water is so liable to fly off, yet it proves of good Effect at a Distance from the Fountain; and it may prove better this Way, if taken up at a right Time, than when it is drunk at the Well in a hot Season, after the Spring hath been exposed several Hours to the Morning Sun.

The best Season of drinking these Waters is doubtless in *April* and *May*, after the Spring Rains have fallen, and before the Heat of Summer comes on; and in the Month of *August*, to the middle of *September*, before the Autumn Rains begin; at both which Seasons they generally taste most of the Mineral: And it is commonly observed, that in the hottest Weather these Waters taste most faint, except after a moderate Shower of Rain, when the Taste turns stronger, but it is weakened after

ter great Rains. The Badness of the Quarters, and the Pleasure and Convenience of walking about in open Air, have however determined the Season of Use to the two intermediate Summer Months; But I enjoin the People who ask my Advice, to drink this Water rather at home in the proper Season, and to put the cold Air off it at a Fire, if it proves cold to the Stomach.

Great Numbers drink the Waters of *Aberbrothock*, without observing any Regimen, or having any Directions from a Physician; nor do I enjoin any considerable Preparation of Body to my Patients, except in very remarkable Foulness of the Juices. Nor do I allow them to take Physick for purging, during the Use of the Water, if they are not to bath in them. The Medicine I ordinarily give, is, *Crystals of Tartar*, to promote the Evacuation in the most ordinary natural Way. With this I sometimes give stewed Prunes, or such like, to stir a sluggish Belly a little.

The vulgar Opinion of all the Benefit of this Water being proportioned to the Quantity drunk, prevails so much here, without any Regard to the Constitution, and Strength of the Patient, or Nature of the Disease; and so many remarkable Accidents have happened by drinking too much, that
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there is just Reason to doubt, whether the Abuse of these Waters does not more Harm, than the right Use does good. My general Rule is not to exceed three *English* Pints drunk leisurely, especially till the Evacuation by Urine begins, chewing Cinnamon, Carvie, or any other easy Aromatick as the Stomach requires during the drinking; and walking in the Intervals of their Drinking and after they have finished their Day's Dose, till they begin to be sensible of Fatigue.

This Rule concerning the Quantity to be drunk, and Exercise while drinking, I have found to require one Caution, and one Exception. The Caution is taken from the Indications in view. When the Springs of the fibrous System are to be screwed up by the Force of the Mineral, its greater Quantity and stronger Consistence with less of the diluent Element are necessary; and therefore the Waters which give the highest Tincture upon Trial, and these drunk in smaller Quantities are preferable: And this makes me regret that there are no tolerable Quarters nor Fields for walking near the *Glendy-well*, which is of the highest Mineral Tincture, next to that of *Peterhead*. I have caused it to be brought sometimes to People's Houses, where it did
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good; but I have never seen the Use of it long enough protracted to make any Observation of Consequence thereon. If our Design principally is to wash the Inwards, the weaker Kinds of the Mineral Waters are most proper.

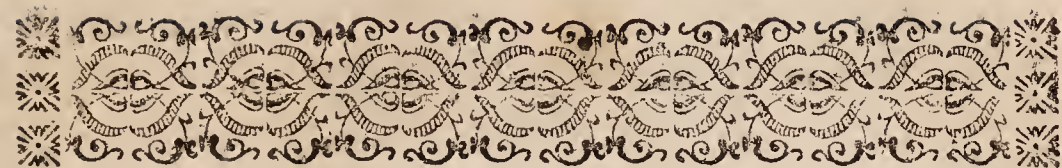
The Exception to Exercise is chiefly in the Case of great Relaxation of the Stomach and digestive Powers, which makes the Patients liable to throw up their Food, as most frequently happens to Females, I order such to feed a-Bed, and to ly close till the first Digestion is accomplished; and this serves to good Purpose preventing the Stomach's casting up its Contents. A Gentlewoman suppoed quite lost in this Disease, her inward Powers being altogether enervated with a miserable Scene of succeeding Symptoms during several Years, was at last carried from this Place to *Peterhead*, where she drank all the Water a-Bed, laying her self to sleep after each Draught; by which Means she retained all; and tho' she got into drinking the Water to the Excess of a *Scottish* Pint a Day, yet she returned perfectly recovered, and remains so these several Years.

The *Aberbrothock* Water has got the Preference to the rest in this Country, most Cures having been made by it. Whether

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this is owing to its Vogue, having occasioned a greater Number of Patients to repair to it; or whether it depends on its intrinsic comparative Vertue from the *Sulphur*, which I begin to discover more conspicuous in it than in the others, I shall not determine; but in all ordinary Cases I recommend the nearest *Spaw*, and have frequently seen the Effect answer, especially by *Kincairdin* Well; and that on our River of *Esk*, in the Skirts of the *Grampians*, the former however comes nearer to *Aberbrothock* Water in the Cure of nervous Diseases. A Girl in bad Case of the Nerves, as Nature was framing her into the Condition of her Sex; and her Brother, a Boy of ten Years of Age, enervated to almost a Cripple all over his Body, are now recovered by drinking and Bathing in these Waters two Seasons.



VII. *An ESSAY concerning the Analysis of humane Blood*, by Dr. GEORGE MARTINE, Physician at St. Andrews.

I. *The Blood a heterogeneous Mass.*

THOUGH the *Blood*, upon its first Eruption out of the Vessels of Animals, seems to be an uniform red Liquor, every Body acknowledges it to be a very heterogeneous Fluid, and composed of Particles very much differing from one another. We are all ready to suspect a Dissimilarity of Parts in that Mass, which is made up of such a Multitude of different Ingredients, and which furnishes such a Variety of Appearances, and new Productions in the animal Body. In like manner from the various Effects of different Medicines, and from some Particles displaying themselves in a morbid State more sensibly than others, *Hippocrates* (a) inferred their prior Existence in the *Blood*; though naturally, and

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(a) De vet. med. xxiv. De nat. hum. v. vi. viii.

in a sound State, from their exact Mixture and Ballance, they do not discover themselves by any sensible Effects.

II. *Its Composition, according to the Ancients.*

2. The most obvious Composition of the *Blood*, is of a thin watery Liquor, and a thick reddish Lump, into which we find it so ready to separate (*a*), upon its Emission out of the Body, throwing off at the same Time a volatile smelling Steam (*b*). The red Part the Ancients looked on as the αἷμα the true proper *Blood*; and the other the φλέγμα, as its diluting *serum*, or Whey, or *white Blood* (*c*). The Redness of the Muscles, and other sanguineous Parts, they justly reckoned the Effects of a greater Quantity of these red Particles, which constituted, according to them, the first and chief Element of the whole Mass. And as they saw (*d*) watery Liquors separated from the Kidneys and Skin in great Quantities, and other lymphatick Liquors in other Parts of the Body, they thought these to be the

(*a*) Galen. de elem. 1, 2. de melanch. 11. Avicen. lib. 1. Fen. 1. doct. iv. cap. i. p. 23. (*b*) Helmont. op. p. 577. Cornel. progymn. phys. vii. p. 290. Malpigh. de polyp. cord. p. 130. Bellin. opusc. ad Pitcarn. xxxix. p. 192. (*c*) Hippocr. de gland. 1, 6. (*d*) Vid. Galen. com. in iii. epidem. 1, 5.

the immediate Product of the *Serum* of the *Blood*; and so the φλέγμα came to be the second Element. And observing this commonly to be of a yellowish Colour; and likewise finding a considerable Quantity of Bile of that Hue to be secreted from the *Blood*, they straightway concluded it to be the immediate Product of these yellow Particles tinging the *Serum*, and another Element of the sanguineous Mass. This too they thought frequently to be secreted by Medicines, which therefore they called *Cholagogues*, or Purgers of *Bile*. And lastly, because the under Part of the *Crassamentum* is generally of a very dark Colour, they reckoned it to be of the same Nature with the Blood or Liquor of the Spleen, and the blackish Liquors thrown out of the Body by Vomit or Stool. And such, from a particular Prepossession, were they pleased to call the μελαγχολία or *black Bile*, which they reckoned as the fourth Element of the *Blood*. And this Composition of the *Blood*, as made up of these four Elements, was most carefully cultivated, and the Theory and Practice of Medicine adapted thereto in all Times, from before the Days of *Hippocrates*, till the last Age, that it began to give Way to Principles of another Kind. The Chymists set up a Laboratory in our

animal System; and the Philosophers and Mathematicians introduced their Diagrams into the humane Body.

3. We cannot deny, that from the *Blood* are produced *Phlegm*, *Bile*, and what the Ancients called *Melancholy*; and consequently that all these exist, at least virtually in the Blood: And so may we say of the *Saliva*, pancreatick Liquor, common Lymph, Oil, *Mucus*, *Lacrymæ*, *Semen*, Arteries, Veins, Nerves, Bones, &c. But we are not straightway to infer that all these did formerly exist in the same Form, as Elements or Principles thereof. What a great Share of their present Form and Appearance do these various Liquors and Particles owe to the Action of the Organs, to which they belong, and to the various Combinations and Circumstances they undergo?

III. *The chymical Analysis of the Blood.*

4. Some of the first Philosophers (*a*) represented the humane *Blood*, as the Product of *Air*, some as of *Fire*, some as of *Water*, and others as of *Earth*. There were not wanting some (*b*) who thought it was

(*a*) Vid. Hippocr. de nat. hum. i. (*b*) Vid. Galen. de decr. Hippocr. &c. viii, 7.

was an Aggregate of such Natures blended together. But the Chymists pretended to put the Composition of the Blood beyond Dispute. By Distillation they resolved it into *Water*, *Sulphur*, *Salt* and *Earth*; and these they affirmed to be the true Principles of which it is compounded.

5. But when we consider the Matter fairly, all we can justly conclude from their Experiments, is, That the *Blood* upon such a Heat being applied to it, and in such and such Circumstances, is capable to exhibit such and such Substances of various Forms and Natures, tho' these, as they appear in the common chymical Analysis, never did, nor never could exist in a living Animal. Indeed there is plainly a great deal of *Water* in our *Blood*. There is likewise *Sulphur* too, or the inflammable Principle. The great Quantity of Oil, wherewith all our Aliments abound, furnish it sufficiently: And the Fat existing in all Animals, shew plenty of it in the *Blood*, from which it is secerned: Nay, in some Circumstances we can discover the oily Particles circulating in the Mass of *Blood* (a). Innumerable Considerations, even the Taste itself, convince us of *Salt* in the *Blood*; and there is

(a) Malpigh. de oment. p. 42. Vit. posthum. p. 92.

no Room to doubt of *earthy* Particles likewise existing therein. And, beyond what the ordinary Chymists took sufficient Notice of, the Air-pump (*a*), as well as the Fire (*b*), and other Operations (*c*), shew there is *Air* in the *Blood*; that is to say, Particles which, when by themselves, and separated from the rest, constitute a heavy elastick Fluid, readily mixing with, and not easily distinguishable from common Air. But all these Elements, as they are called, can neither exist in the *Blood*, nor make up its Composition in the common Sense the Chymists were wont to understand them. The *aerial* Particles never exert their elastick Force in a healthy State (*d*), and the fetid volatil and fixed *Oils*, and the alkaline *Salt*, are entirely the Effects of a Process that can never exist in the animal Body (*e*), and of a Degree of Heat no living Creature is able to bear (*f*).

IV. *The Cartesian Hypothesis of the Particles of the Blood, &c.*

6. What an odd Work did Mr. *Des Cartes*,

(*a*) Boyle in phil. trans. 63. abr. ii. p. 228, &c. (*b*) Hales veg. stat. vi. exp. 49. p. 166. (*c*) Papin. in phil. trans. 121. abr. ii. p. 247. (*d*) Boerh. chem. i. p. 525. (*e*) Helmont. oper. p. 91, 6, 7. Boerh. chem. ii. Process. 119. (*f*) Boerh. *ibid*,

tes, and his mathematical Disciples, make in the animal Machine. The Particles of his several Elements served them upon all Occasions; and you would think they had really seen the different Spheres, Cubes, Prisms, Pyramids, Parallelopipeds, &c. circulating in the Mass of *Blood*; and wisely adapting themselves to all the Purposes they were pleased to appoint them; and passing through various Channels and Orifices of a round, square, oval, triangular, quadrangular, oblong, or any other Figure you could fancy.

7. But they might have learned from *Fabr. ab Aquapendente* (a) and Dr. *Glisson* (b), how readily all the Vessels of an Animal would affect a round Figure; the Necessity of which was fully made out by Dr. *Pitcairn* (c). And as to the circulating Fluids, about which is our main Business at present, taking Things in a geometrical Light, upon a nearer View and the strictest Scrutiny, we can perceive no such variously figured Corpuscles in the *Blood* of Animals. All we can discern, when assisted with the best Microscopes, are spherical Particles swimming in a pellucid Liquor. This *Malpighi*

(a) De form. fœt. ii. 2. p. 81. (b) De ventric. &c. xxiii. 21.
(c) Diff. de circ. sang. per vasa, &c. § 15.

pighi (a) and *Leeuwenhoek* (b) discovered; and their Observations are easily verified by ocular Inspection. And this leads us to a juster and more intelligible Analysis of the *Blood*.

V. *The Blood made up of Globules of different Orders or Magnitudes.*

8. By numberless Observations, *Leeuwenhoek* has shown the largest and most visible Particles of the *Blood* to be those *Globules* which tinge it of a red Colour; and which therefore do chiefly make up what we call the *Crassamentum* of extravasated *Cruor*. They are of a certain determined Magnitude (c), the same in different Parts of the same Animal, and even in different Animals however differing in Bulk; of the same Size in an Ox, as in a Sheep, or a Rabbit (d). And these plano-oval Particles in the *Blood* of Fowls and Fishes, which resemble those *Globules* of terrestrial Animals, are the same in the greatest Whales, as in an Eel or a Frog; the same in an Eagle, as in a Sparrow. Those greatest Spherules we chuse to call the *great red Glo-*

(a) Vit. posth. p. 92. (b) Phil. trans. 102. p. 23. (c) Arcan. nat. det. epist. 60. p. 78. Tabor. exerc. med. i. 1. § 2. p. 58. (d) Leeuwenhoek ibid. & Epist. 128. p. 220.

Globules of the Blood, or, the Globules of the first Order.

9. These are easily perceived by any body ; but the sharp sighted *Leeuwenhoek* went further, and discovered the Composition of these *Globules*, which he found (a) made up of six smaller Spheres clustered together in a very regular Way ; and that so nicely, that in a perfect *Globule* the Composition comes to be imperceptible : But sometimes he saw a red *Globule* loosening and breaking into these compounding Spherules ; and sometimes he had the good Fortune to perceive these running together, and beginning the Composition of a new red *Globule* These smaller Spherules we call *Globules of the second Order*.

10. This curious and accurate Observer of the *minima naturæ* did not stop here ; he saw (b) in the Chyle and *Blood* a great many Particles six Times less than these *Globules* of the *second Order*, and thirty six Times less than the great red *Globules*. The *Globules* of the *second Order* are then to be looked on as compounded of these smaller Particles, which therefore are just-ly

(a) Ibid. Epist. 56. p. 8. Epist. 57. p. 36. Epist. 128. p. 221, 222. Anat. & contempl. contin. p. 119, 120, 121. (b) Arcan. nat. dict. ep. 56. p. 12. Anat. & contempl. par. i. p. 30, 34, 35. Contin. p. 119.

ly to be reckoned as another Class, or *Globules* of a *third Order*.

II. But moreover, though the smaller *Globules* are perfectly transparent, and consequently not distinguishable one from another, we are certain from the same Mr. *Leeuwenhoek's* Observations, that there are innumerable Vessels of such a Smallness, that none of these hitherto mentioned *Globules* could pass: so that it is necessary to suppose inferior Classes of *Globules* of the *fourth, fifth, sixth, &c. Orders*. Whence by Analogy we are to conceive *Globules* of the *third Order*, made up of six *Globules* of the *fourth*; and these again made up of six of the *fifth Order*; and so on thro' several Degrees, the Number whereof we are not to take upon us to determine. *Leeuwenhoek* (a) saw Vessels, the Width of which was less than the eighth Part of the Diameter of a *red Globule*; so that the Particles passing through them should be upwards of five hundred Times less than such *Globules*, and consequently smaller than those of the *fourth Order*. Yea, upon a careful Examination (b), he could perceive still smaller Vessels, narrower than the tenth Part of the Diameter of a *red Glo-*

(a) Anat. & contempl. par. i. p. 31. (b) Ibid. p. 32.

Globule, and consequently not capable of transmitting Spherules greater than if a *red Globule* were broken down into a thousand Parts. These should almost coincide with *Globules* of the *fifth Order*; and that as near as we can expect Observations of such minute Things to carry us.

12. What a beautiful Harmony and Regularity do we here perceive in the Construction of the Mass of *Blood*!

Magnum certe opus oculis video.

The *Globules* of the *first Order*, are made up of six *Globules* of the *second*, these of six of the *third*, these of six of the *fourth*, these of six of the *fifth Order*, and so on. And accordingly we find the *Globules* of the higher *Orders* may be broken down into their compounding Particles. In some Cases, that the Blood may be turned into *Serum*, αἷμα διαρρῶσθαι, was observed by *Aristotle* (a). Nor did such a Change of the Blood (*in serum sanguis tandem ferè totus degenerat*) escape the Observation of the accurate Dr. *Harvey* (b). But the judicious and most careful *Boerhaave* (c) has most distinctly of all observed how very
apt

(a) Hist. animal. iii. 19. (b) De gen. animal. li. p. 160.
(c) Aphor. § 94, 95. chem. ii. proc. 127-

apt the *Globules* of the higher *Orders* are to lose their Contexture, and to be broken down into the smaller compounding Particles, when they are left to themselves, and without the Assistance of the Circulation.

13. It seems to be very well worth observing, That just six smaller Spherules should make up a larger *Globe*, if you were to chuse the most convenient and firmest Way of constructing it. Were there but 2, 3, 4, or 5. compounding *Globules*, then in the running together of these, the new compounded Particle would be too angular, and its Parts easily disjoined. On the other Hand, were there 7, 8, 9, or 10, &c. too many of them would be out of Contact from the rest, and consequently for that Reason, not adhering so firmly neither; and so their Cohesion likewise easily dissolved. But in a regular Coalescence of six, every Spherule is in Contact with other four, just in four equidistant Points; so that they are very firmly joined, and not very subject to a Dissolution from external Injuries. In *Fig. 1.* and 2. of *TAB. I.* we have the six smaller Spherules, but just touching one another, before they run together. In *Fig. 1.* we have a View of five of them, A, B, C, D, E, the sixth F, being out of Sight: But
turning

turning them a little, as in *Fig. 2.* we see distinctly all the fix compounding Spherules, three of them lying before, and as many behind. In *Fig. 3.* and *4.* we see the same Spherules adjusted to one another, and compacted together into one greater Globe; wherein I have expressed the Lines of Contact, by which we conceive they are run together, and where they would loosen if they were to be dissolved and broke asunder. It seemed the more necessary to give this Delineation that *Leeuwenhoek's* own Figures (*a*) are not very regular, nor apt to give a just enough Idea of the Coalescence of the compounding Particles, or of the true Construction of the compounded *Globule*.

14. From this Construction of the *Blood*, we see no Room left for *Bohn's* (*b*) Idea of the *red Globules*, as made up of viscid *Bulbulæ* inclosing little Spherules of Air, which *Bernouilli* (*c*), *Keil* (*d*), and some others of our mathematical Physiologists thought so much for their Purpose. And when, from microscopical Observations (*e*), they found

(*a*) Arcan. nat. det. epist. 55. p. 2. Epist. 128. p. 221, 222.
 (*b*) Circ. anat. xiii. p. 199. (*c*) Diss. de mot. musc. § 5. (*d*) Tentam. v. p. 135. (*e*) Vid. Leeuwenhoek Arcan. nat. det. epist. 65. p. 161. in phil. trans. 117. p. 380. Cowper in phil. trans. 280. abr. v. 1. p. 331.

found a *Globule*, upon its arrival at a small Vessel it was not able easily to go through, to be compressed and flatned in its Passage; and immediately when got into a wider Channel, to resume its former round Figure, they forthwith concluded that Appearance to proceed from an inclosed elastick Fluid, restoring itself after Compression. How much more simple, yea obvious, would it have been to have had Recourse to that common Property of all Fluids, whose Particles, when touching one another, affect to form themselves into a spherical Figure. This is the *Congruity* of *Hook*, the *nisus in contactum*, and the *vis cohesionis*, and *contractio naturalis* of *Bellini*, which Sir *Isaac Newton* chose to call by the old Words, *Attraction* and *Gravitation*; which these great and inquisitive Philosophers, following the wisest of the Ancients, found to be inherent in all Bodies we have Occasion to make our Observations upon, and to be the immediate Cause of many of the principal *Phænomena* of Nature.

15. Not only the compounding Particles of each *Globule* are endowed with this Property, but likewise the *Globules* themselves, have a very strong mutual Attraction or *nisus in contactum* & *cohesionem*.

When

When extravasated *Blood* is left to itself, we soon perceive how forcibly the *red Globules* run together and coalesce, and squeeze out the intervening *Serum* in some Animals with a greater, in others with a smaller Force. This Force in the *Blood* of Deers is so weak, as that it scarcely coagulates into a firm *Crassamentum* (a). On the contrary, in some great and strong Beasts, it becomes a tough and almost indissoluble Mass: So that the *Blood* of Bulls was frequently drunk by the Ancients as a most effectual Poyson (b). Nay, even the pellucid watery *Serum*, which consists of *Globules* of inferior Orders and Magnitudes, is very ready to lose its Fluidity. In a certain Degree of Heat, before much of it is exhaled, it becomes a firm and solid Substance (c).

16. It will perhaps be asked what we have done with the *Fibres* (*Ives*), which many, and these great Men too, have described as very essential Parts of the *Blood* of Animals. But if we deal candidly, tho' even *Malpighi* (d) did strenuously stand
F up

(a) Aristot. hist. animal. iii. 19. De part. animal. ii. 4. Meteorolog. iv. 7. Plin. hist. nat. xi. 38. (b) Herodot. hist. iii. 15. Plin. hist. nat. xi. 38. xx. 9. xxiii. 7. Plutarch. in vita Themistocli. (c) Golzadius apud Barbat. diss. de sang. &c. p. 10. Boyle of Fluids, &c. Abr. i. p. 329. (d) De polyp. Cord. p. 125 Vit. posthum. p. 45.

up in their Defence, I am afraid we must yield to the superior Force of *Borelli's* (a), and *Bohn's* (b) Arguments, and confess that we can find no Vestiges of them in the *Blood* in a natural State. If they were in the Vessels of Animals, they could not but disturb the Circulation. And their Existence seems to be entirely owing to a subsequent Preparation of extravasated *Blood*, whose viscid Parts, by the Heat of warm Water, and Conquassation, or some other similar Artifice, run together in such new Forms.

VI. Of the Temperaments denominated from the constituent Parts of the Blood.

17. All Animals (I mean such as we are chiefly concerned with) have *Globules* of all the several *Orders*, scattered through their *Blood*; but in no certain or fixed Proportion; which may likewise be affirmed of the constituent Parts of the *Blood*, when they are considered as giving Rise to the compounding Humours of the Ancients, and to the chymical Elements. From the Consideration of which Variety, it will be of Use to take a View of the various *Tempera-*

(a) De mot. animal. ii. Prop. 132. p. 168. (b) Circ. anat. iii. p. 187.

peraments of the humane Body, so much talked of, and so little understood, that we may the better understand the Systems of the Ancients, and also have some Idea of a *middle Constitution*, to which all the Calculations relating to the Properties of the *Blood* are to be referred.

18. If the *Blood* be plentiful, and abound with *red Globules*, or those of the *first Order*, such a State will plainly enough constitute what the Ancients called *temperamentum sanguineum*; the Symptoms whereof are easily explained from these Circumstances.

19. When the *red Globules* were scarce in the *Blood*, and it was found thin and watery, this was called a *phlegmatick Temperament*.

20. If the *Blood* happened by any means to acquire a great many thick, tough, and less moveable Particles, these the Ancients looked on as the chief Ingredients in the *atra bilis*; and such a Constitution was with them the *temperamentum melancholicum*, which the learned *Boerhaave* (a) thinks may be better explained from Chemistry; and that in such a State, it is chiefly

F 2

the

(a) Inst. med. § 228. Aphor. § 1092, 1095.

the *earthy* and some of the more viscid *oily* Particles that abound.

21. Our Aliments are generally of an acedent kind, or the Product of such; but by the Action of our Bodies on them, they are soon reduced to a neutral State. Yea, such is the frame of Animals, that the Force of the Circulation bringing the Particles of the *Blood* always farther and farther from their former Acidity, animalizes them (if I may use the Word) more and more, renders them volatile, and perspirable (*a*); and at length, if there be no new Supplies or Obstacles to hinder it, even disposes them to an alcalescent State (*b*), the Breath stinks (*c*) and the *Blood* turns putrid (*d*). Now the *Bile* is found (*e*) to have undergone a long Course and Circulation, before it is separated from the rest of the *Blood*, and to be one of the most perfect Animal Liquors, and the furthest removed from any acedent Quality; and in Plenty and Perfection in those who have a strong Circulation, and all their vital Operations carried on with Vigour (*f*). And
it

(*a*) Helmont. p. 91, 4. p. 148, 31. p. 149, 34. p. 150, 39. (*b*) Vid Boerh. aphor. § 80. 109. Chem. ii. proc. 88. p. 293. (*c*) Proc. 95. p. 313. (*d*) Proc. 100. p. 323. (*e*) Vid. Boerh. inst. med. § 99. p. 350. (*f*) Hoffman. med. rat. i. p. 182.

it is such a Constitution going to too great a Height, that will truly make what the Ancients called a *choleric* or *bilious hot Temperament* (a).

22. The direct contrary of which, importing an irregular and weak Circulation, and not sufficient to overcome, and alter the Disposition of our Aliments, seems to coincide in a great Measure with the *Cachexia* of the Ancients (b); which might be looked on as a sort of *Temperament*, and a Deviation from the natural and regular Constitution; and not so properly to be a particular Disease, as a State of the Body giving Rise to a great many Diseases easily flowing from such a State. And this frequently falls in with the *phlegmatick Temperament*; as on the other Hand the *sanguineous* and *choleric* are oftentimes blended together. You might find out other general Deviations of the Body from a middle State, which might be called *Temperamentum oleosum, salinum, calidum, frigidum, &c.* as you please to consider the various Ingredients and Dispositions of the *Blood*, and Operations of the Body.

23. Πάντων δὲ ἄριστα διακρίται ἄνθρωπος ---

F 3

μυθε-

(a) Aristot. probl. xiii. 7. Petron. satir. § 128. Martial. epigr. iv. 4. Aul. Gell. ii. 23. (b) Vid. Arct. de chronic. caus. &c. i. 16. Cæl. Aurelian. chronic. iii. 6.

μηδεμίαν δύναμιν ἰδίαν ἀποδεικνύμενΘ. (a).
 The *Blood* then, which is as it were in a middle between all these, which has neither too much *Cruor*, nor too much *Serum*, (οὔτε λίαν παχὺ, οὔτε λίαν λεπτὸν (b), nor too much *Earth*, *Salt*, or *Oil*, nor the Product of too weak, nor of too strong a Circulation, we call the Blood of a *regular Constitution*, or *middle Temperament*, to which the rest are to be referred, and which People are understood to mean, when they speak of the Blood in general, and in a Sound State. ὑγιαίνειν μὲν οὖν μάλιστα, ὁκ ὅταν μετρίως ἔχη ταῦτα τῆς πρὸς ἀλλήλα χρήσιΘ καὶ δυνάμειΘ καὶ τοῦ πλήθους, καὶ μάλιστα, ἣν μεμιγμένα ἦ. Αλγέει δὲ, ὁκ ὅταν τί τουτέων ἔλασσον, ἢ πλεῖον εἴη, καὶ μὴ κεκρημένον ἢ τοῖσι ξύμπασιν (c). And indeed we are all but too liable to a Deviation from this desirable middle State. The *Blood* of very young ones is generally thin and watery, that of old People, thick and black; but the middle aged Folks are readiest to have a biliary and sanguineous Disposition. Ἐν μὲν τοῖς πάντων νέοις τὸ αἷμα ἰχωροειδὲς ἐστὶ καὶ πλεῖον, ἐν δὲ τοῖς γέρουσι, παχὺ καὶ μέλαν καὶ ὀλίγον, ἐν ἀκμάζουσι δὲ μέσως (d).

VII.

(a) Hippocr. de vet. med. xxxv. 19. (b) Aristot. hist. animal. iii. 19. (c) Hippocr. de nat. hum. vi. 1. (d) Aristot. hist. animal. iii. 19.

VII. *The Proportions of the chymical Elements.*

24. The Ancients did not pretend to determine the Proportions their four Elements bear to one another. But the Chymists have had a better Opportunity to make a tolerable Estimate of the Quantities of their Principles of the humane *Blood*, which however you are not to expect as perfectly exact, or nearly alike in all Trials. However, by way of Example, we shall take an Experiment of the accurate Mr. *Boyle* (a), who by distilling ten Ounces and seventy three Grains of humane *Blood* at a slow Fire, found it to yield the following Substances.

Grains.

Phlegm rising by a gentle Heat, differing little (b) from common Water, with two or three Grains of volatile Salt dissolved in it,	}	3527
Volatile Parts lost in Distillation, which we presume to be of the same Nature with the collected Phlegm, - - - -	}	266
F 4		And

(a) Hist. hum. Blood, p. 231. Abr. iii. p. 459. (b) Vid. Vieussens in phil. transf. 241. Abr. iii. p. 243.

	Grains.
And so these two Phlegms put to- gether, - - - - -	} 3793
The dry Substance or <i>Residuum</i> of this Distillation. - - - - -	} 1080

This *Residuum* distilled a second Time
at a stronger Fire, gave,

Fetid Oil, - - - - -	168
Dry volatile Salt purified from its adhering Spirit, - - - - -	} 65
Volatile Salin Spirit collected, - - - - -	48
Particles lost, partly this Salin Spi- rit, and partly Air, which in this Period of the Distillation be- gins to rise (<i>a</i>), - - - - -	} 427
The Air thrown off by such a Di- stillation, according to <i>Hales's</i> Experiment (<i>b</i>) should be, - - - - -	} 171
And so the Spirit lost was, - - - - -	256
Which added to gr. 48, the former volatile Salin Spirit makes - - - - -	} 304
<i>Caput mortuum</i> - - - - -	372

The gr. 168 of fetid Oil analysed in *Vi-*
eussen's Way (*c*), should have given

Salin Spirit, - - - - -	99
Yellow thick Oil, - - - - -	60

Fix-

(*a*) *Hales* veg. stat. exp. 49. p. 167. Exp. 51. p. 168. (*b*)
Ibid. exp. 49. p. 166. (*c*) *Phil. trans.* 241. *Abr.* iii. p. 245.

Grains.

Fixed Salt,	-	-	-	3
Fixed Earth,	-	-	-	6

The *gr.* 304, and *gr.* 99 of Saline Spirit, making in all *gr.* 403, analysed according to a like Method (a) should have given,

Water,	-	-	-	278
Volatile Salt,	-	-	-	125

Caput mortuum, *gr.* 372, calcined, gave,

Fixed Salt,	-	-	-	18
Most fixed Earth,	-	-	-	26
Particles evaporated in the open Fire,				328

The Proportions of whose Ingredients cannot well be determined; but from some Sort of Analogy we guess them to be about these following, neglecting the Air, which too perhaps was dissipated at this Time,

Oyl,	-	-	-	-	273
Salt,	-	-	-	-	22
Earth,	-	-	-	-	33

From all which the Blood being Unity, consisting of *gr.* 4873, a Chymist would reckon

(a) Boyle hist. hum. bl. p. 112, 125, 126, 242. Abr. iii. p. 473, 475.

reckon these Elements in the following Proportions,

Water	-	-	gr. 4068	-	-	$\frac{5}{6}$
Oil	-	-	333	-	-	$\frac{1}{15}$
Salt	-	-	190	-	-	$\frac{1}{25}$
Earth	-	-	65	-	-	$\frac{1}{75}$
Air	-	-	171	-	-	$\frac{1}{28}$

25. Thus we see how vastly the watery or *phlegmatick* Part of the *Blood* abounds above the other Principles. It takes up $\frac{5}{6}$ Parts of the whole Mass; and other Experiments (*a*) show it still in a greater Quantity: And it exceeds the *Oil* or *Sulphur* above a Dozen Times; and the *Oil* is in greater Plenty than any of the rest of the Ingredients. However I shall not say but some of these Elements may still be resolved into one another, or into more simple Parts, so as to increase or diminish the above Proportions.

VIII. *The proportional Quantities of the Globules of different Orders.*

26 But our main Business, as being hitherto less minded by Physicians, is rather
to

(*a*) Boerh. chem. ii. Proc. 119.

to determine the Proportions and various Properties of the Parts or Elements of the *Blood*, analysed in the most simple, that is, (if on this Occasion we may be allowed the Expression) in a geometrical Way, and to find out the several Quantities of the *Globules* of different *Orders*. Now in cold and sufficiently coagulated *Blood*, the tough *Crassamentum*, and its surrounding Fluid, *Serum*, are ordinarily found (*a*) to be pretty nearly equal to one another. And Dr. *Furin* (*b*) supposes the Interstices of the *red Globules* of the *Crassamentum* to be nearly equal to the *Globules* themselves, so as to render them $\frac{1}{4}$ of the whole Mass.

27. The Interstices would indeed take up almost such a Space, if the *Globules* were all regularly disposed, so as to ly perpendicular over one another in a square Form. But it is plain they could not well subsist in that State: Their natural Lubricity would be readier to dispose them in a more compact Figure, as perhaps in a quincuncial Order or so. And in such a Case, by a Calculation differing considerably from *Tabor's* (*c*), I find that the interspersed *Spatiola* put all together, would take
up

(*a*) Vid. Boyle hist. hum. bl. p. 252. Abr. iii. p. 460. (*b*) Phil. trans. 361. Abr. v. 1. p. 326. (*c*) Exerc. med. i. 1. § 5. p. 61.

up but $\frac{1}{4}$ of the *Crassamentum*, and the *Blood Globules* $\frac{3}{4}$ thereof: So that on this Supposition; these would be $\frac{3}{8}$ Parts of the whole Mass. But neither is it likely they should be so very regularly and compactly disposed; and therefore, making some Allowances for Irregularities, it may seem reasonable rather to reckon, that these *Globules* should take up only about $\frac{2}{3}$ of the *Crassamentum*, and consequently $\frac{2}{6}$ or $\frac{1}{3}$ of the Mass, and the *serous* Part to take up the other $\frac{2}{3}$ thereof. In this Case the *red Globules* being supposed to be scattered uniformly through the *Blood*, their mean Distance from one another by a geometrical Calculation, comes out about $\frac{1}{4}$ Part of their Diameters: And this falls in nearly with *Tabor's* (a) Observation; which however I will not say was made, or could well be made with sufficient Accuracy.

28. Now as the *Blood* is a Compound of *Globules* of all the several *Orders*, so is the *Serum* a Compound of the *Globules* of the *second Order*, and of all the inferior *Orders*. And as the *red Globules*, or those of the *first Order*, take up a third of the whole Mass, so from Analogy (and we have no other Way left us to determine the

Mat-

(a) Exerc. med. i. 1. § 5. p. 60.

Matter) it is not improbable that these of the *second Order* should take up a third Part of the *Serum*, and that the other two thirds are made up of Globules of the *third* and subsequent *Orders*, and so on in this Progression.

The intire Mass of <i>Blood</i> ,	-	-	1
Globules of the <i>first Order</i> ,	-	-	$\frac{1}{3}$
<i>Serum</i> ,	-	-	$\frac{2}{3}$
Globules of the <i>second Order</i> ,	-	-	$\frac{2}{9}$
The rest of the <i>Serum</i> consisting of	}		$\frac{4}{9}$
Globules of the <i>third</i> and inferior			
<i>Orders</i> ,	-	-	
Globules of the <i>third Order</i> ,	-	-	$\frac{4}{27}$
The Remainder of the <i>Serum</i> , being	}		$\frac{3}{27}$
Globules of the <i>fourth</i> and inferior			
<i>Orders</i> ,	-	-	
Globules of the <i>fourth Order</i> ,	-	q. p.	$\frac{1}{10}$
The Remainder, being Globules of	}		$\frac{1}{5}$
the <i>fifth</i> and inferior <i>Orders</i>			
Globules of the <i>fifth Order</i> ,	-	-	$\frac{1}{15}$
The Remainder, being Globules of	}		$\frac{2}{15}$
the <i>sixth</i> and inferior <i>Orders</i>			
Globules of the <i>sixth Order</i> ,	-	-	$\frac{2}{45}$
Aggregate of the <i>seventh</i> and in-	}		$\frac{4}{45}$
ferior <i>Orders</i> ,			
Globules of the <i>seventh Order</i> ,	-	q. p.	$\frac{1}{34}$
Aggregate of the <i>eighth</i> and infe-	}		$\frac{1}{17}$
rior <i>Orders</i> ,			
Globules of the <i>eighth Order</i>	-	-	$\frac{1}{51}$
			Aggre-

Aggregate of the <i>ninth</i> and infe-	}	$\frac{1}{25}$
rior <i>Orders</i> , - - - <i>q. p.</i>		
<i>Globules</i> of the <i>ninth</i> Order, -		$\frac{1}{77}$
Aggregate of the <i>tenth</i> and inferi-	}	$\frac{1}{38}$
rior <i>Orders</i> , - - - <i>q. p.</i>		
<i>Globules</i> of the <i>tenth</i> Order, -		$\frac{1}{114}$
Aggregate of the <i>Globules</i> of the	}	$\frac{1}{57}$
<i>eleventh</i> and inferior <i>Orders</i> , if		
there be such - - - -		

IX. *The Density of the Mass of Blood.*

29. Having thus considered the several Quantities of the compounding Particles of the *Blood*, it is convenient next to determine their specifick Weight or Quantity of Matter contained under a given Bulk, comparing them, as also the entire sanguineous Mass, to some other Body of a fixed and determinate Density, as common Water, which is the ordinary Standard for such Calculations.

The truly honourable Mr. *Boyle* (a), as he began a great many curious Re-searches of this Kind; so he was the first who attempted to settle the comparative Weight of humane *Blood*, which according to his Trial came out to be to Water as 1041 to 1000.

(a) Hist. hum. Bl. p. 36. Abr. iii. p. 450.

1000. But as his Experiment was not done with that Accuracy as to satisfy himself, who in every thing was very scrupulous, he recommended it to the further Inquiry of others. And accordingly the accurate Dr. *Jurin* (a), by a Set of Experiments of this Kind, found the Density of the *Blood* to be 1054. As far as I can judge, by comparing it with Rain-Water, or that of a clear limpid Rivulet, but differing little from Rain-Water, and taking great Care that there be no Bubbles of Air in the *Blood* when I made my Experiments, I found their Densities as 1000 to 1056, or 1057, or as 18 to 19, *q. p.* Perhaps the Water I used being lighter than the common *London* Water, which I presume was made Use of in *Jurin's* Experiments, might occasion this small Variation.

30. But we must observe a very remarkable Difference in the *Blood*, according to its different States; whether as circulating in the Vessels of the Animal, or as it is exposed to the cold Air; in which Condition we commonly examine it; from whence, after sufficient Allowances, we must investigate its real and natural Density, while in a live State.

We

(a) Phil. trans. 361. Abr. v. i. p. 324.

We know all Bodies whatsoever to be somewhat condensed by Cold, and expanded again by Heat; so that we can safely affirm the cold *Blood* to be specifically heavier, than the warm Fluids circulating in the Vessels of a living Animal; but by how great an odds, is not so obvious or easy to be determined.

31. Some People seem to estimate the Heat and Density of the living *Blood*, according to what they find it upon its first Emission out of the Body: In which Case it is plain, that in its very exit, and while you collect a sufficient Quantity to make your Experiment, it has lost considerably both of its Heat and natural Expansion.

32. One would be ready to judge of the Expansion of *Blood*, from what we find it in Water. Now Dr. *Halley* (a) found Water, reasonably cold, but not freezing, to be expanded $\frac{1}{26}$ Part by boiling; that is, as I judge, from *grad.* 2, to *grad.* $34\frac{1}{2}$, in a Thermometer constructed in Sir *Isaac Newton's* Way: The same Difference was assigned by *Leeuwenhoek* (b). Whence Water in a temperate Degree of Heat, about *grad.* 4, should be expanded $\frac{1}{93}$ Part, by the Heat of *grad.* $12\frac{8}{10}$, to which I find the Ther-

(a) Phil. trans. 197. Abr. ii. p. 34. (b) Arcan. nat. detect. ep. 68. p. 214.

Thermometer rises by the *Blood* of those living Animals, whose vital Operations come nearest to the Humane, not *grad.* $14 \frac{3}{11}$, as Sir *Isaac Newton* (a) and Mr. *Hales* (b), by some Mistake reckoned it. But by repeating some Experiments of this Nature, I could not perceive the Expansion to be near so great, as is deduced from *Halley's* and *Leeuwenhoek's* Experiments. Perhaps in their boiling Water, there were some Air Bubbles, which they did not consider.

33. This makes me suspect some Mistake to have been likewise in Dr. *Tabor's* (c) Experiment, by which he determined the cold *Serum*, when brought to the Temperature of living *Blood*, to be expanded $\frac{1}{2}$ Part.

34. Weighing carefully a certain Quantity of *humane Blood*, drawn from a Man in Health in the Morning, and flowing directly into a Phial that was immersed in Water, which raised the Liquor in the Thermometer to *grad.* 12,8; and then letting it cool in a temperate State of Air, about *grad.* 4, I found it condensed $\frac{1}{35}$ Part. So that the Density of the *Blood*, when circulating in living Animals, is to its Density,

G
sity,

(a) Phil. Transf. 270. Abr. iv. 2. p. 2 (b) Veg. stat. l. Exp. 20. p. 59. (c) Exerc. med. l. 1. §7. p. 65.

sity, when reduced to the Coldness of temperate Air, as 134, to 135, or 992 $\frac{1}{2}$ to 1000. Water and Urine tried the same Way, suffered very near the same Degrees of Rarefaction and Condensation. Hogs *Blood* seemed to undergo some greater Change: But the Difference was very small; no greater than what might flow from a greater Quantity of oily Particles in its Composition: And we know Oil is more rarefied by a given Degree of Heat than Water.

35. There is however one Consideration too often neglected; but which nevertheless must be taken in, before we can apply our Calculations with the desired Accuracy to Liquors in different Degrees of Heat. The Vessels, in which our Areometrical Experiments are performed, suffer likewise a Dilatation, by the Application of Heat, though in a much less Degree than the contained Fluids. It is the Excess of the Expansion of these above the Dilatation of the containing Vessels, that is commonly recorded in Observations of this kind: But they must both of them be taken in to determine the real Changes the Fluids undergo in the different States of Heat and Cold. Glass I suppose from good Reasons may be lengthned by the Heat of the human

man

mane Body about $\frac{1}{1200}$ Part of its Dimensions; so that a thin Glass Phial shall be enlarged in its Contents about $\frac{1}{450}$ Part. Whence the real Density of Cold Blood, to its Density when circulating in a live Animal, comes out in a compound *Ratio* of 135 to 134, and 400 to 399, which is nearly, as 100 to 99. And so from what has been said we may conclude the real Densities of Water and *Blood* to be in these Proportions,

Water in a temperate Degree of	}	1000
Heat, - - - - -		
freezing, - - - - -	}	1003
of the Heat of the <i>Blood</i> in		
the humane Body, -	}	990
<i>Blood</i> of the Heat of temperate Air, 1056		
in its natural living State -		1045 $\frac{4}{9}$

36. Hence we shall be able to determine the Weight of a given *Moles* or Bulk of *Blood*, which is not so accurately done hitherto as it deserves: This being of singular Use in our Enquiries concerning the Velocities, Moments, &c. of the circulating Liquors, and the Forces of the Heart, and other Organs in the animal Machine.

From the accurate Experiments of Dr. *Bernard*, Sir *Isaac Newton*, Mr. *Everhard* and others, we conclude a cubick Inch of

Rain Water to weigh $253 \frac{1}{3}$ Grains. Whence a Cubick Inch of warm *Blood*, shall be found equal to $gr. 253 \frac{1}{3} \times \frac{1045}{1000} = 264 \frac{3}{4}$: And an Ounce of *Blood* will be 1,813 Inches. An *Averdupois* Ounce, which nearly coincides with the ancient *Roman* Standard Weight, according to the very nice Experiments of Mr. *Everhard*, and Mr. *Stewart* Professor of natural Philosophy in the University of *Edinburgh*, is found to weigh $gr. 437 \frac{1}{2}$; and therefore is in Water equal to 1,727 Inches; and 1,6526 Inches of warm *Blood*.

Seeing from the Principles of Geometry, a Cube is to its inscribed Sphere, as 1 to 0,5236, it easily follows that a Globe of Water of an Inch Diameter must be $gr. 253 \frac{1}{3} \times 0,5236 = 132 \frac{2}{3} q. p.$ and a Sphere of *Blood* of the same Size shall weigh $gr. 138 \frac{5}{8}$.

X. *The Densities of the Globules of different Orders.*

37. And now we come more closely to Work, to determine the Densities of the several Parts of the sanguineous Mass, wherein Mr. *Boyle*, otherwise very accurate, has led very many less examining People into a most enormous Error, when, by some Mistake

Mistake or other in these Experiments (*a*) he most trusted to, he reckoned the specifick Weight of *Serum* to that of Water, as 1174 to 1000, and consequently a good deal heavier than that of the common Mass or *red Blood*. A thousand Observations and Circumstances may convince us of the contrary; but we shall confine our selves to these Experiments that determine directly their specifick Weights with the greatest Accuracy. We formerly (*b*) found the Density of cold *Blood* to be 1054, or rather 1056: And Dr. *Furin* (*c*), from a great many Trials, all done with utmost Care, concludes the specifick Weight of *Serum* to be only 1030. Dr. *Tabor's* (*d*) Observation makes it 1031: And I found it nearly the same. So that when compared to lymphid Rain-Water, it may safely enough be reckoned 1032, which is then $\frac{1}{4\frac{1}{3}}$ Part lighter than Blood. The *Serum* therefore, when reduced to the Heat of live *Blood*, should be $1032 \times \frac{22}{100} = 1021 \frac{2}{3}$.

38. Since the *Crassamentum* is about one half of the whole Mass (*e*), it, when taken by itself, must as far exceed in Density the common Mass, as this does the *Serum*;

G 3

and

(*a*) Hist. hum. bl. p. 71. Abr. iii. p. 461. (*b*) § 29. (*c*) Phil. Transl. 361. Abr. v. i. p. 323. (*d*) Exerc. med. l. i. § 7. (*e*) § 26.

and consequently should be 1080, to which Supputation Experience comes very near. For as a Medium of several Trials, Dr. *Jurin* (a) found it 1084. The very different Consistence of the *Crassamentum* of the *Blood* of different Persons will not allow us to expect a great Uniformity in such Experiments; however I found it generally something above 1080. Perhaps the handling of it might have squeezed out several of the thinner and lighter Particles of the interspersed *Serum*; so that we found it specifically heavier than naturally it should have been.

39. About two thirds of this Mass of *Crassamentum* is taken up by *red Globules*, the other third by *Serum* (b); from whence the Density of these *Globules* is found 1104. It comes out the same from our former Determinations of the Density of *Serum*, as 1032 (c), and that of *Blood* as 1056 (d); and the *red Globules* being a third of the intire Mass of *Blood* (e). It is true Dr. *Jurin* reckoned (f) the specifick Gravity of the *Blood Globules* to be 1126; but he supposed the Quantity of these *Globules* only a fourth Part of the whole Mass; whereas the Reasons formerly adduced, obliged

(a) Phil. Transf. ibid. p. 327. (b) § 27. (c) § 37. (d) § 49. (e) § 47. (f) Phil. Transf. ibid. p. 326, 327.

bliged us to reckon them a third thereof. So then the true Density of a *red Globule* circulating in the *Blood* of a living Man is $1104 \times \frac{22}{100} = 1093$.

40. And thus we have found that the *red Globules*, or those of the *first Order* are the heaviest Parts of the *Blood*; and that they, as well as the grosser *Serum*, by being broken down into smaller *Globules*, lose something of their specifick Weight: So that it is very obvious to infer, that as the *Globules* of the *first Order* are the densest, as well as the biggest Particles of the *Blood*, so these of the *second Order* come nearest to them in each of these Properties: These of the *third Order*, as they are smaller, so are they specifically lighter than the preceeding, but bigger and heavier than the *Globules* of the *fourth*, or subsequent *Orders*, and so on: The *Globules* of the larger Size always having their compounding Elements more straitly compacted than the smaller ones, whose Parts are not so strongly bound to one another: So that we are to conceive the Mass of *Blood*, as made up of a Congeries of Spherules differing in Density as well as Magnitude.

41. We have been able to determine the real Density of the *red Globules*; but how shall we arrive at any Knowledge of the *Glo-*

bules of the inferior *Orders*? Nature makes no Separation of them from one another out of the Animal; nor do we know by any Art a Method of reducing them into distinct Parcels. But notwithstanding these Disadvantages, we are not to despair of coming at a Determination of this so seemingly difficult Question. We have the Density of the Mass of *Blood* 1045 (*a*), of the *red Globules* 1093 (*b*), and of the *Serum* 1022 (*c*); and from these three *Data*, we shall necessarily have a very regular and consistent Series, if we reckon the Differences of Density between any *Order*, and its subsequent one, to be a third Part greater than the Difference between that subsequent one, and what immediately succeeds it. Thus if $\alpha, \beta, \gamma, \delta, \text{\&c.}$ be the Densities of the *Orders* A, B, C, D, &c. then $\alpha - \beta \times \frac{2}{3}$ will be equal to $\beta - \gamma$, and $\beta - \gamma \times \frac{2}{3}$ equal to $\gamma - \delta$, and so on; these Differences of Densities decreasing in a Geometrical Proportion; so that at length the very minute *Globules* of the inferior *Orders* come all to be nearly of the same specifick Weight. By this Rule the specifick Weights of the several *Orders* of *Globules* are in the following Proportions,

The

(*a*) § 35. (*b*) § 39. (*c*) § 37.

The Mass of warm <i>Blood</i> or the	}	
<i>Globules</i> of the <i>first</i> and all		1054
the subsequent <i>Orders</i> , -		
<i>Globules</i> of the <i>first Order</i> , -		1093
The <i>Serum</i> , or <i>Globules</i> of the	}	
<i>second</i> , and all the subsequent		1022
<i>Orders</i> , - - -		
<i>Globules</i> of the <i>second Order</i> , -		1053
<i>Globules</i> of the <i>third</i> and subse-	}	
quent <i>Orders</i> . - -		1006
<i>Globules</i> of the <i>third Order</i> , -		1027
<i>Globules</i> of the <i>fourth</i> and sub-	}	
sequent <i>Orders</i> , - -		995
<i>Globules</i> of the <i>fourth Order</i> , -		1009
<i>Globules</i> of the <i>fifth</i> and subse-	}	
quent <i>Orders</i> , - -		988
<i>Globules</i> of the <i>fifth Order</i> , -		998
<i>Globules</i> of the <i>sixth</i> and subse-	}	
quent <i>Orders</i> , - - -		984
<i>Globules</i> of the <i>sixth Order</i> -		990
<i>Globules</i> of the <i>seventh</i> and sub-	}	
sequent <i>Orders</i> , - -		980
<i>Globules</i> of the <i>seventh Order</i> , -		985
<i>Globules</i> of the <i>eighth</i> and sub-	}	
sequent <i>Orders</i> , -		978
<i>Globules</i> of the <i>eighth Order</i> , -		981
<i>Globules</i> of the <i>ninth</i> and subse-	}	
quent <i>Orders</i> , -		977
<i>Globules</i> of the <i>ninth Order</i> , -		979
		<i>Glo-</i>

<i>Globules of the tenth, and subsequent Orders,</i>	-	-	} 976
<i>Globules of the tenth Order,</i>	-	-	
			977

42. We are not to wonder that the *Globules of the seventh*, and all the lower *Orders*, are specifically lighter than Water of the same Degree of Heat; they take up only the eleventh Part of the Mass of *Blood (a)*. And the Liquors of our Bodies are all stored with oily light Particles, and that in greater Abundance than either with Salt or Earth (*b*); which therefore are capable to render the Parts of the Blood lighter than Water, were it not that the *vis vitæ*, constantly operating in the animal Machine, the sanguineous Elements are wrought up and compacted together in such a Way as to render all the larger sized *Globules* much denser, and the whole Mass considerably heavier than Water.

XI. *The Diameters, Magnitudes, Weights, &c. of the Globules of the Blood.*

43. From the Construction of the *Blood* formerly described (*c*), it is plain that the Quantity of Matter of the *Globules* of any
Order

(a) § 28. (b) § 24. (c) § 9, &c.

Order is sixfold the Quantity of Matter of the *Globules* of the next succeeding *Order*; and the same *Ratio* would hold of their Bulk or Size, if they were all of the same Density. But by their Variety in this Respect, their Bulks or Magnitudes do not exactly follow this Proportion; for these are directly as their Quantities of Matter, and inverſely as their reſpective ſpecifick Weights. And their Diameters are as the Cube Roots of theſe Magnitudes. Thus the Magnitude of a *red Globule*, is to that of a *Globule* of the *ſecond Order* in a Compound *Ratio* of 1 to $\frac{1}{6}$ directly, and 1093 to 1053 reciprocally; that is, as $\frac{1}{1093}$ to $\frac{1}{1053}$, or as 1 to $\frac{1}{5,78}$. And their Diameters as $\sqrt[3]{1}$ to $\sqrt[3]{\frac{1}{5,78}}$, that is as 1 to $\frac{1}{1,795}$, and ſo on of all the reſt as in the following Table.

The

The Orders of Glo- bules.	Quantities of Matter of the Globules.	Magnitudes of the Globules.	Diameters of the Globules.
1	1	1	1
2	$\frac{1}{6}$	$\frac{1}{5,78}$	$\frac{1}{1,795}$
3	$\frac{1}{36}$	$\frac{1}{33,83}$	$\frac{1}{3,234}$
4	$\frac{1}{216}$	$\frac{1}{199,4}$	$\frac{1}{5,842}$
5	$\frac{1}{1296}$	$\frac{1}{1182}$	$\frac{1}{10,57}$
6	$\frac{1}{7776}$	$\frac{1}{7043}$	$\frac{1}{19,17}$
7	$\frac{1}{46656}$	$\frac{1}{42033}$	$\frac{1}{34,77}$
8	$\frac{1}{279936}$	$\frac{1}{251249}$	$\frac{1}{63,1}$
9	$\frac{1}{1679616}$	$\frac{1}{1504400}$	$\frac{1}{113}$
10	$\frac{1}{10077696}$	$\frac{1}{9000000}$	$\frac{1}{208}$

44. These are the Proportions the several *Orders of Globules* bear to one another: But it will be required to determine, if possible, their real Dimensions compared to some

some known Magnitude. It is satisfying and useful, as well as curious, to reduce to Measure and Weight the subtile Particles of Matter. The best Philosophers of all Ages have been very sollicitous in their Enquiries about them, as being the chief Springs of the Operations of Nature. Many had assigned to the heavenly Bodies their proper Dimensions; but the great Sir *Isaac Newton*, by an incomparable Strength of Genius, found out their real Weights, or Quantities of Matter, and, as it were, put the stupendous Masses of the Sun and Planets in the Scales; an Attempt which our Forefathers would have thought beyond the Reach of Mortals! But still he is as much admired; and surely we are more indebted to him for his wonderful Discoveries concerning the inconceivably minute Particles, the Rays of Light; and the several very minute Thicknesses of Bodies reflecting all the several sorts of Rays of different Sizes and Orders, and producing all the various Colours in the Universe. And no true Philosopher will judge it a fruitless or vain Undertaking to investigate the real Sizes of the Particles of *Globules* of the *Blood*. They are a Part of our selves, and a considerable Ingredient in our very Beings.

45. Mr. *Leeuwenhoek*, who spent his Life in microscopical Observations; and in particular, very often viewed the *Blood* through his most excellent Glasses, used to reckon (*a*) the Diameter of a *red Globule* of the *first Order* to be the $\frac{1}{150}$ Part of the Diameter of a large Grain of Sand, and consequently $\frac{1}{150 \times 150 \times 150}$ Part of its Bulk. But this is somewhat too vague; he not having carefully or positively enough determined the real Diameter of such a Grain of Sand, compared to some known Measure: However we may presume he meant by it a Grain of Sand of the larger Sort, the Thickness whereof he judged to be about $\frac{1}{30}$ Part of an Inch (*b*); and consequently an Inch should be 3000 Times broader than the Diameter of a red Globule. Dr. *Tabor* (*c*) computed it $\frac{1}{3500}$ Part of an Inch. But his Method is not capable of the desired Exactness. Dr. *Furin* (*d*) taking a very pretty Way of investigating the true Size of very small Bodies, reckoned the Diameter of a *Globule* of *Blood* to be $\frac{1}{3240}$ Part of an Inch. But as this was deduced from an Observation, the Circumstances of which were not so very accurate as one could

(*a*) Anat. & contempl. p. 35. & passim alibi. (*b*) Ibid. p. 39. (*c*) Exerc. med. l. i. § 3. (*d*) Phil. Trans. 355. Abr. iv. l. p. 444.

could have wished, that Defect was amply supplied by some subsequent Observations carefully made by him, and then confirmed by *Leeuwenhoek* himself; whereby they both found the apparent Diameter of a *red Globule* to be exactly $\frac{1}{1940}$ Part of an Inch (*a*). If this Globule be supposed circulating in our Body, and heated to the ordinary Degree of living *Blood*, then indeed its Diameter will be something enlarged, to wit, in the *Ratio* of $\sqrt[3]{100}$ to $\sqrt[3]{99}$ (*b*) which is nearly in the *Ratio* of 300 to 299. Whence the true Diameter of a *red Globule* in its natural State comes out $\frac{1}{1940} \times \frac{300}{299}$, or $\frac{1}{1933,5}$ Part of an Inch. In the same Manner the Diameter of a *Globule* of the *second Order* is equal to $\frac{1}{1933,5} \times 1,795$, or $\frac{1}{3470,6}$ Part of an Inch: And so on thro' the other Orders, as in the following Table.

(*a*) Phil. Trans. 377. p. 341. (*b*) § 35.

Orders

Orders of Globules.	Diameters of the Globules in Parts of an Inch.	Orders of Globules.	Diameters of the Globules in Parts of an Inch.
1	$\frac{1}{1933,5}$	6	$\frac{1}{37065}$
2	$\frac{1}{3470,6}$	7	$\frac{1}{67228}$
3	$\frac{1}{6253}$	8	$\frac{1}{122000}$
4	$\frac{1}{11295}$	9	$\frac{1}{218500}$
5	$\frac{1}{20437}$	10	$\frac{1}{402170}$

46 Perhaps it may be worth while to observe, that Sir *Isaac Newton* (a) has determined the Thickness of a Particle of Water reflecting *Scarlet* of the *second Order* of Colours to be $\frac{14,75}{1000000}$ Parts or $\frac{1}{67197}$ Part of an Inch, which almost coincides with $\frac{1}{67228}$ Part of an Inch, the Diameter of the *Globules* of the *Blood* of the *seventh Order*.

47. From hence it will be easy to determine the real Magnitudes of the *Globules* of each of these *Orders*, compared to some known Measure. The Bigness, for Ex-

(a) Opticks ii. 2. p. 206.

Example, of a *Globule* of the *first Order* is to a Sphere of an Inch Diameter, in the triplicate *Ratio* of 1 to $1933\frac{1}{2}$, which is as 1 to 7228240000. And the Bigness of the other *Globules* are readily found in the same Way.

48. A Sphere of Water of an Inch Diameter was observed (a) to weigh gr. $132\frac{2}{3}$; and therefore a Sphere of Matter of the same Density with the *red Globules* of *Blood*, should weigh gr. $132\frac{2}{3} \times \frac{1.093}{1.000} =$ gr. 144,986, consequently a Grain should be able to counterpoise $\frac{7228240000}{144,986}$ or 49854600, that is near fifty Millions sanguineous *Globules* of the *first Order*. What a prodigious Minuteness does this seem to be! And yet these are the biggest Particles that naturally exist in the circulating Fluids of the humane Body; and immensely bigger than the lesser sized *Globules*; and all of them are again to be conceived as made up still of minuter Particles, and Elements of different Kinds.

I will praise thee, [O GOD,] for I am fearfully and wonderfully made: Marvellous are thy Works, and that my Soul knoweth right well, Psalm cxxxix. 14.

(a) § 36.



VIII. *The Experiment of cutting the Recurrent Nerves carried on farther than has hitherto been done. In a Letter from Dr. GEORGE MARTIN, Physician at St. Andrews, to Mr. Monro Professor of Anatomy at Edinburgh, by whom it was communicated.*

THE Moderns have acquired a much exacter Knowledge of the Structure of the humane Body than the Ancients could possibly come at. We have the Advantage of the Time and Pains they laid out in making their Observations; and beside, can boast of many Opportunities they were entirely destitute of. Yet we cannot but admire these great Men, if we will form a Judgment of them from the Monuments of their Genius and Industry they left behind them, tho' some of these are lost, and many of them, though preserved in Books, are sometimes too much slighted by the over negligent Possessors of these Treasures.

2. The first Physicians had but a very faint Notion of the Brain presiding over the Animal System by the Mediation of the spinal

Fig. 1.

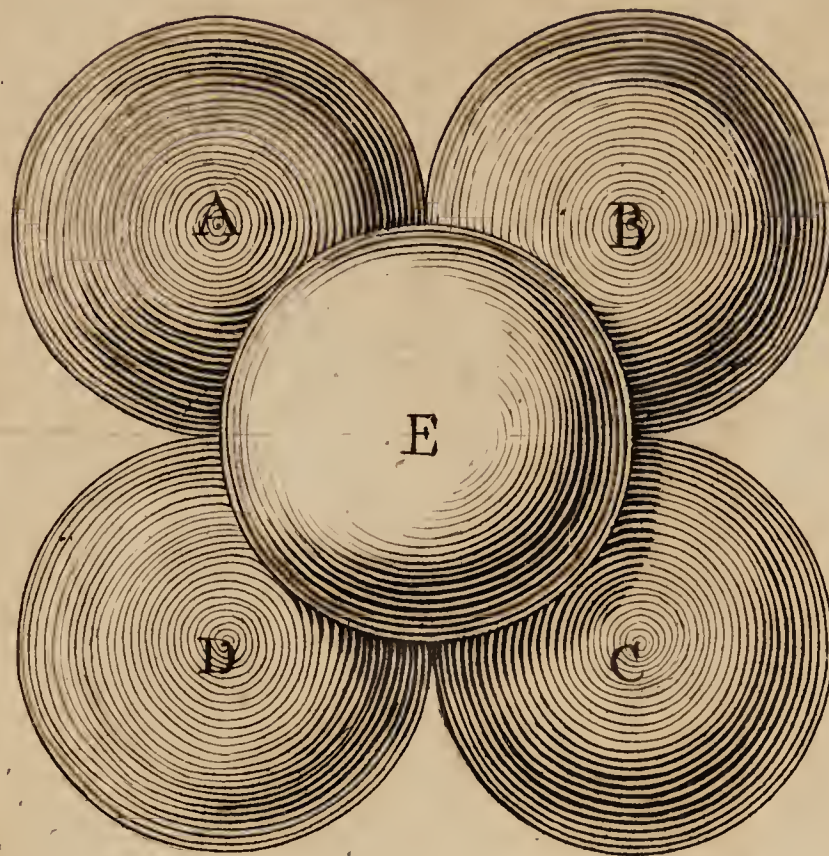


Fig. 3.

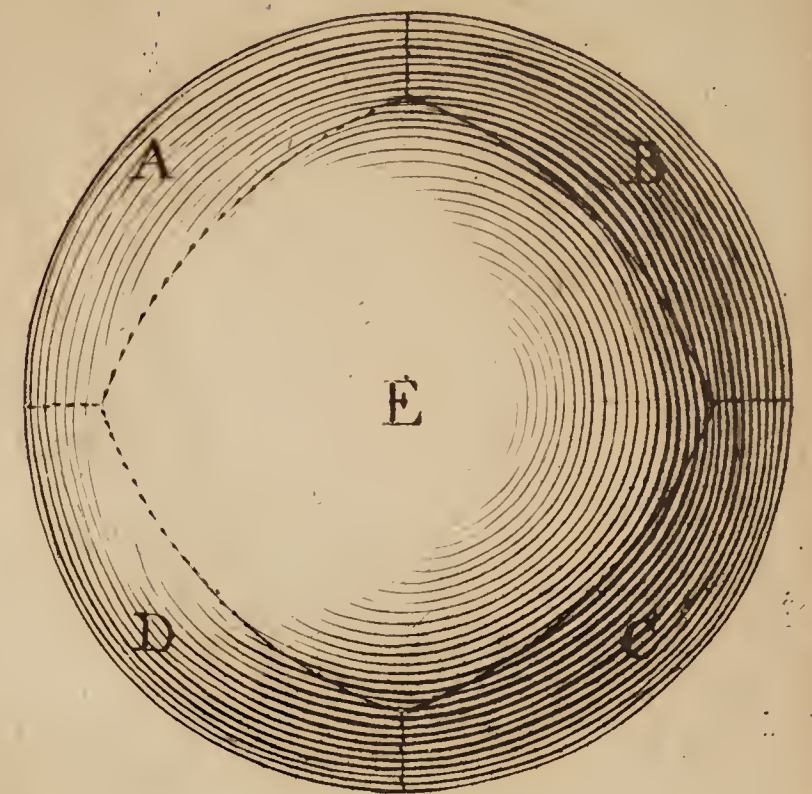


Fig. 2.

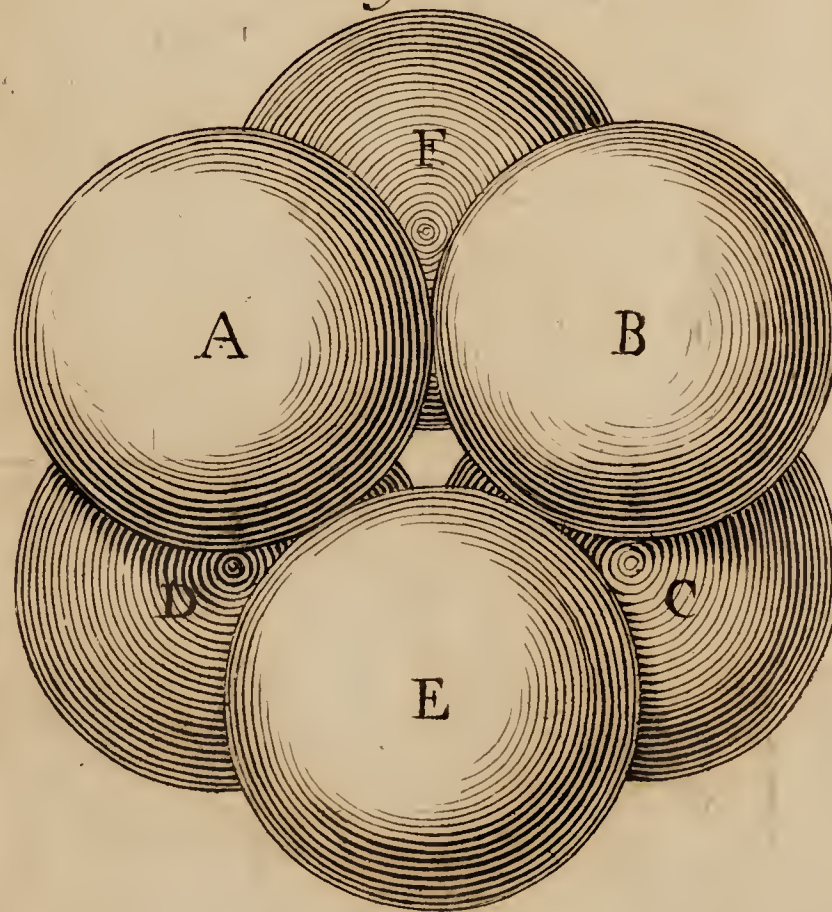


Fig. 4_F

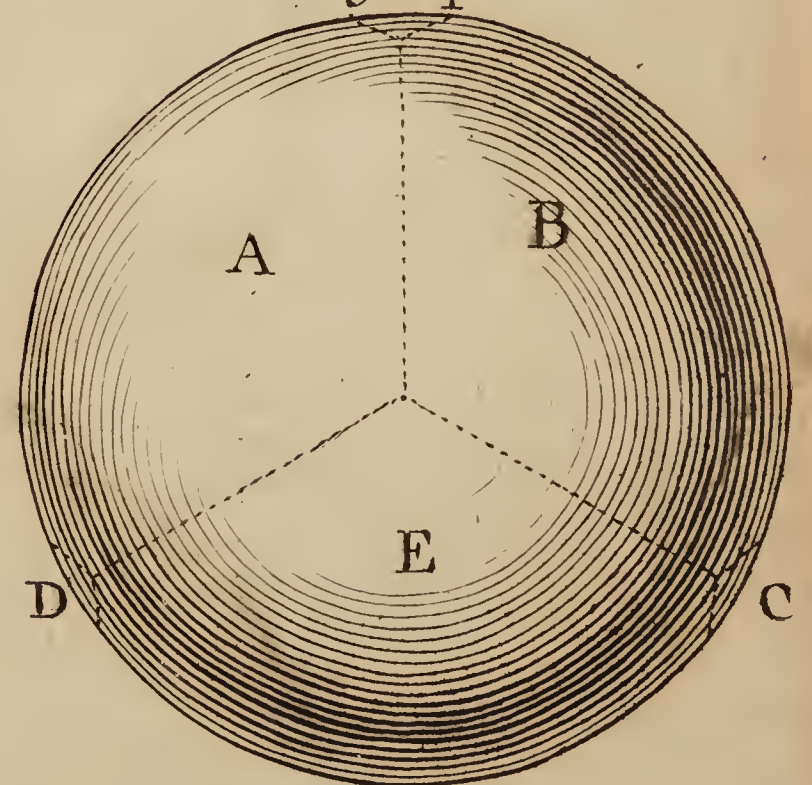
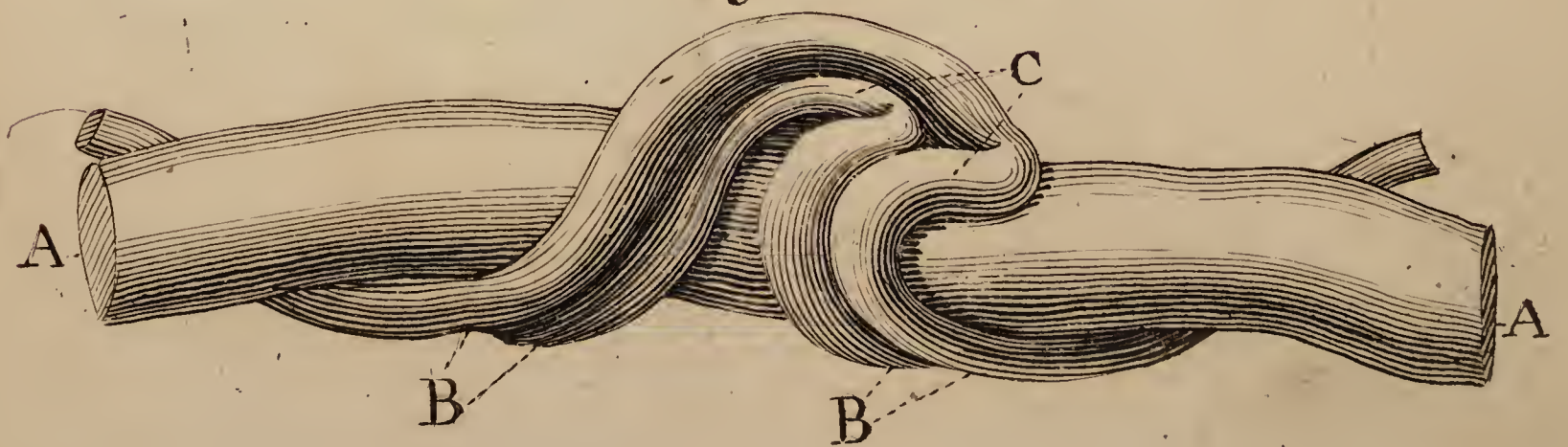


Fig 5.



Spinal Marrow and Nerves produced from it, and distributed to the rest of the Body. And we must acknowledge this was not sufficiently understood before *Herophilus* and *Erasistratus*, the greatest Anatomists of Antiquity, who explained this Scheme, and left the World no Room to doubt of this elegant Piece of Mechanism of the animal Body. Physicians began to dissect with more than ordinary Care both living and dead Animals; and they soon found, that by cutting, tying or compressing any Nerve, or any other Way intercepting its Communication with the Brain, the Parts to which it belonged were immediately deprived of all Sense and Motion.

2. It was easy to confirm this Doctrine by Experiments on any of the ordinary Nerves. But one of the prettiest Instances of it, was the making Ligatures upon the Vessels at the Side of the Wind-pipe, and immediately striking the Animal Dumb, however noisy it was before. The first Makers of this Experiment thought the Animal turned comatous, or fell asleep; and ascribing this Effect to the intercepting any Passage of vital Blood from the Heart to the Brain, by the Way of the Arteries; they gave these Blood Vessels the Name of *Carotids*, καροτιδών. But in the

Days of *Ruffus* (*a*), this sudden Silence of the Animal was found to proceed from the tying of the adjacent Nerves. And *Galen*, who seems to have laboured this Affair more than any of his Predecessors, evidently proved (*b*), That tying the Arteries solely produced little Change on the Animal. In this Case, (laying aside the captious Cavils and Oppositions of *Hoffman*, *Vanderlinden*, *Wepfer*, and others of the Moderns, who disputed against the Experiment, which however easy, they would not take the Trouble to repeat) we must conceive the Brain to have been furnished by the vertebral Arteries. And so he found all that the Animal suffered in the Experiment of tying the whole Vessels at the Side of the *Trachea*, to be a sudden Obmutescence; which entirely proceeded from the intercepting the nervous Influence on the Muscles of the *Larynx*: For he discovered (*c*) that these Nerves were derived from the *Par vagum*; and that they, making a Turn under the right subclavian Artery, and descending *Aorta*, climbed up along each Side of the Wind-pipe, to furnish these Muscles.

4. The Oddness and Novelty of all this Doctrine,

(*a*) De app. part. i. 34. (*b*) De decr. Hipp. &c. ii. 6. De util. resp. v. (*c*) De us. part. vii. 14. xvi. 4. De loc. affect. i. 7.

Doctrine, was in those Days surprizing (*a*). The *Virtuosi* at *Rome* knew nothing of it; yea *Alexander* of *Damascus*, the *Peripatetick* and Preceptor of *Boethius*, was resolved to deny and oppose it at any Rate. He would rather resist the Evidence of Sense, than yield any thing that might contribute to the rising Glory of *Galen* his Rival. But our Anatomist, in the midst of a learned and judicious Assembly, consisting of Adversaries as well as Friends, by ocular Demonstration, gave them at once a convincing Proof of the Truth of his Doctrine, and of his own extraordinary Skill in Dissections. Yea this was confirmed by some casual Observations made on some of our own Species (*b*). An unlucky scrophulous Boy falling into the Hands of an ignorant Surgeon, lost the half of the Strength of his Voice, by having one of the Recurrent Nerves cut along with the Tumor. However he escaped better than another Boy, who in the like Case was indeed cured of the *Strumæ*, but, having both the Recurrents extirpated, was left quite dumb.

5. This Experiment of cutting these Nerves in brute Animals, was repeated and

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(*a*) De præcog. ad posthum. v. (*b*) Galen. de loc. affect. i. 7.

confirmed by *Vesalius* (a), otherwise, you know, no great Favourer of the Doctrines or Glory of *Galen*. And I my self about twelve or thirteen Years ago, when I was first setting out to make such Experiments, trying it in a Pig, with all the Circumspection I was then capable of, found it to answer exactly. So that though this elegant Operation has been much out of Use among the Moderns, insomuch that one might have suspected it had been given over for Want of Success, yet, however great Regard I have to your Judgment and great Skill in Anatomy, I could not consent to you, when, from a pre-conceived Theory you seem to think (b) *it probable the Voice would not be entirely lost, tho' both the recurrent Nerves were cut, so long as the superior Branches still supply the Larynx*. It is true that *Galen* (c) himself taught that there was on each Side an Inosculation of the Extremity of the Recurrent, with one of the superior Branches of the eighth Nerve. This was copied by *Nic. Massa*, painted by *Eustachio*, and confirmed by *Willis* and the Moderns: But still on Dissection I could not find that there was any regular Distribution of Nerves

(a) *Hum. corp. fab. vii. 19. p. 574.* (b) *Of the Nerves, p. 12.* (c) *De us. part. avi. 4.*

Nerves to the proper Muscles of the *Larynx*, from any other Origin beside the Recurrents. This you know I guessed to be the Case: And now I find it to be true in Fact.

6. It is plain then, That the Voice must be lost, however sound and free we suppose the superior Branches of the *Par vagum*. But still there is some hankering Doubt in this Affair; and it is proposed to try this over again, and keep the Animal alive some Weeks, to see if the Voice would at all return. We know not of any of the Ancients carrying on the Experiment thus far; except we say *Galen's* scrophulous Boys show the absolute Irrecoverableness of the Voice. But to put the Matter beyond all Doubt, I repeated the Experiment this Spring on a young Sow five or six Weeks old, some Days before it was weaned from sucking, and took greater Notice of all the Circumstances than I had done formerly. I could observe with the Ancients; and so did two curious young Gentlemen who assisted me, that upon cutting the Nerve on one Side, the Voice was not destroyed, only it became weaker; but upon cutting the other, it was entirely lost, though, by the Sound of the Breath, and the Motion of the *Thorax*, you would manifestly have seen a

fruitless *Conatus*, and the Creature straining to make a Noise. And so I very well understood *Vesalius*, when he says, *Pulchrè auditur quam validam efflationem animal citra vocem moliatur, recurrentibus nervis cultelle divisis*. The Creature, when dismissed, seemed well enough, sucked the Mother for some Days, lived with the rest of the Litter seemingly hearty and well, though always dumb. It could indeed make some little, just audible, grunting Noise, but could never give a Squeak in the ordinary Manner of these Animals. From the Beginning it breathed as if the *Glottis* were too wide, especially in the Heat of the Day. And this Difficulty in some Weeks began to increase upon it; so that in Process of Time it became more lazy and solitary, frequently retired to the Shade by it self; by Degrees lost its Strength and Appetite, pined away, and at length in about six or seven Weeks died. Upon inspecting the *Larynx*, I could not say it had undergone any great or remarkable Change. The Orifices of the Ventricles seemed, I thought, laxer, and a little above them the Membrane of the *Glottis* was somewhat inflamed on each Side.

7. The Ancients knew, That the Noise of the Voice depended on a due Narrowness
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of the Aperture of the *Glottis*. And the Author of the Book *de voce & anhelitu* (a), ascribed to *Galen*, expressly affirms, *Si instrumenta vocis amplissima essent, tunc vox destrueretur*: So that on the cutting the Recurrent Nerves, we are to conceive the *Glottis* to stand open, and not to be shut at the Pleasure of the Animal. And what else indeed can we expect, when the nervous Influence on the Muscles belonging to the *Arytænoid* Cartilages is taken away in such a Manner, that they can never be brought to a due Constriction, nor the Ventricles of the *Larynx* suffer any Variety of Contraction and Dilatation.

(a) Tract. iii. p. 63.



IX. *An ESSAY on the Nutrition of Foetuses*, by ALEX^r. MONRO, *Professor of Anatomy in the University of Edinburgh*, and F. R. S.

WHILE our Senses and Judgment are in the present imperfect State, it is no Wonder that Men should differ so widely in their Opinions of Things, and in the Consequences they draw from the Appearances

ances in Nature. Such is the Case at present between my ingenious valuable Friend Mr. *Gibson* and me. He has given a learned critical Account of the different Opinions concerning the *Nourishment of Fætuses* in *Art. XIII.* of your first Volume, where after examining the Arguments made use of for proving their Nourishment to be conveyed by the Navel only, he concludes them to be insufficient, and supports the Doctrine of the Aliment being received by both the Mouth and Navel. I formerly wrote Mr. *Chefelden*, and he published some Facts serving principally for proving the Negative of a *Fætus* taking its Food at the Mouth; so that Mr. *Gibson* very justly names me as one of those who differ in Opinion from him, which I cannot help doing still; and therefore believe my self engaged to give my Reasons of Dissent; since there is no Certainty that Dr. *Bellinger*, whom he more directly attacks, either has seen, or will answer my Friend's Essay.

The Work you are engaged in does not seem to admit of numerous Defences, Replies, &c. which sometimes Disputes are liable to run into; and you have given a strong Caution to your Correspondents to beware of indecent Expressions. I hope both these Inconveniencies will be prevented

ed here; for Mr. *Gibson* has already mentioned the most material Arguments made use of to support the Doctrine he favours; and I shall faithfully represent any other Reasons furnished by Books, or my own Reflexions, which favour his Side of the Question; and therefore Replies will be at least shorter if not unnecessary; and this Way of managing the Dispute will show you that there is no great Anxiety on my Part to bring People at any rate into my Way of Thinking; and I dare promise on Mr. *Gibson's* Behalf, that he will not value a Victory in Point of Argument near so much, as he would be satisfied to see the Truth ascertained by our Labours, tho' Judgment should be given against him. In short, Gentlemen, our Case is that of two Friends differing in Opinion in an Enquiry after Truth, and not being able to convince each other, are willing to appeal to better Judges, that they may determine who has the greatest Probability on his Side, without believing our Honours at Stake, which ever Way Sentence is given.

I shall pass without any Examination *Alcmæon's* Opinion of the *Fætus* receiving its Nourishment by the Pores or Vessels on the Surface of its Body, while it is a forming; both because there are no Experiments

ments for proving whether the Veins there take in more at this Time, than the Arteries throw out ; and that it is not the Subject of the present Question, which only concerns the *Fœtus* after it is form'd; whose Nourishment is now allowed by all, either to pass from the *Amnios* by the Mouth into its chylopoietic Organs; or to be conveyed into its Blood Vessels, by Means of the umbilical Vessels; or to be furnished by both. I maintain the second of these Opinions, and therefore endeavour to render the other two improbable; by which you see I am under the Disadvantage of supporting a negative Proof.

The Determination of the Question as now stated, may be reduced to the Solution of the few following Problems.

I. *How far the Mouth, or umbilical Vessels are necessary to the Nourishment of Fœtuses.*

II. *Whether the Liquor of the Amnios is proper Food for a Fœtus.*

III. *Whether this Liquor passes into the Stomach of a Fœtus.*

In this Paper I shall only consider these
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Problems, so far as they relate to viviparous Animals, and shall soon send you a Sequel to it, wherein I shall examine, *How far the Analogy of oviparous Animals, and of Plants serves to explain or confirm the Solutions, which I give here to the foregoing Problems.*

In treating this Subject, I must beg leave to throw away that humble Regard to Authority, which bore sovereign Sway in the Schools of Physick so long, and to pass all the hypothetical Reasonings to be met with in Books unmentioned; it is only well vouched Facts, and reasonable Consequences from them, that I will take any Notice of; for on these, and these only it is, that a rational Foundation of any Part of Medicine can be laid. The first Thing therefore which I shall do, is to set down such Facts as I may have occasion to assume in my subsequent Reasoning, together with some others, serving either to confirm and establish those, or to render them more clear and intelligible; though few of them are new, yet most of them are neglected in the common Books of Anatomy, and no Author of my Acquaintance has collected them.

That the Truth of these Facts may be more unquestionable, I shall either point
out

out the Manner in which others may observe them; or where I had not the Opportunity of an exact enough Examination my self, I shall quote my Vouchers, who are Authors of the best Characters for Knowledge and Candour: And if I affirm at any Time the Being or Structure of Things that are not demonstrable to the Sight, I shall set down other Facts from which they seem to be plainly and necessarily concluded to be true. But because my Design confines me from entring into very particular minute Descriptions, I generally refer to Books where such Descriptions are to be had, so that those who desire to be more fully instructed, may know where to be informed; and others, who do not incline to give themselves any further Trouble, may believe as well as they please of my Honesty, and will meet with no great Interruption in reading, by the small Mark of a Reference to the Quotations.

The preliminary Facts.

1. THE humane *Uterus* has numerous Orifices of Vessels opening into its Cavities to pour out Liquors there (*a*).

These

(*a*) Tho. Bartholin. anat. reform. lib. i. cap. 28. Santorin. observ. anat. cap. xi. § 11.

These Liquors may at any Time be seen ouzing out, by gently pressing the Substance of an opened *Uterus*.

2. TOWARDS the *Fundus* of the Womb especially, these Orifices are found to be the Extremities of Canals that come out from larger Cavities lodged within the Substance of the Womb; these Cavities are commonly called *Sinuses* (a).

3. THE *Sinuses* are much of the same Texture with the Cells of the Spleen, or rather of the *corpora cavernosa penis*, being membranous Cavities communicating with each other, and having numerous Arteries spread on them, whose lateral Branches open into the Cells, from which Veins go out to be joined to other Veins, that return the Blood from the other Parts of the Womb (b).

4. THESE *Sinuses* are distended with Blood in the Time of the *Menses*, when their Orifices also are enlarged (c).

I have seen this in several Women I dissected.

5. DURING the Time of Pregnancy, the *Sinuses* and their Canals that open into the

(a) Bartholin. Anat. reform. lib. i. cap. 28. Morgagn. Advers. anat. iv. animad. 26, 27. (b) Malpigh. in Epist. ad Spon. Littre in Memoires de l'Acad. des Sciences, 1701. (c) Bartholin. Anat. ref. lib. i. cap. 28. Morgagn. Advers. anat. i. § 33. Adv. 4. § 27.

the Womb, are gradually distended and enlarged.

In a Woman who died three or four Months gone with Child, I saw the Orifices of these Canals large enough to receive a Goose Quill, the Sinuses being considerably larger. At the End of Nine Months the Sinuses will contain the largest Finger (*a*); and the Canals from them will receive the little Finger (*b*).

6. BESIDES the reticular Bundles of muscular Fibres, which enter into the Structure of the Womb (*c*), I have seen *Ruysch's* orbicular Muscle at its *Fundus* (*d*).

7. THE *Placenta* generally adheres to, or near to the *Fundus* of the Womb.

All agree in this. In two Women with Child, whom I had occasion to open, the *Placenta* adhered principally to the anterior Part of the *Fundus*.

8. THE *Placenta* is covered on the Side next to the Womb, with a fine membranous Continuation of the *Chorion* (*e*).

I saw this distinctly in both the Subjects I dissected.

9. THE Extremities of the umbilical Vess-

(*a*) Santorin. Observ. anat. cap. xi. § 9. Morgagn. Adv. anat. i. § 26. (*b*) Morgagn. ibid. (*c*) Malpigh. in Epist. ad Spon. (*d*) Ruysch. Epist. de musc. in fundo uteri. (*e*) Ruysch. Thes. anat. 11. Affer. 4. n. 18. not. 1. & Thes. 5. n. 41. Santorin. Observ. anat. cap. xi. §. 11.

Vessels pierce this Membrane, and shew their very small Orifices on its Side next to the *Uterus*; and therefore it is compared to the villous Coat of the Intestines (*a*).

10. THE *Allantois* was carefully sought for in both the Subjects I opened; but we could see no such Cavity, nor Liquor in it. The Membranes had a loose Connection, by a cellular Substance, and a fine transparent Membrane was observed between the *Chorion* and *Amnios*.

11. THE *Uteri* of other Animals have Vessels opening into their Cavities, as well as the humane Womb, and the same Trial discovers them.

12. THE membranous Continuation of the *Chorion* has not yet been discovered on the exterior Surface of the *Placentæ* of Brutes; but their Secundines have numerous Orifices of the umbilical Vessels opening on their Surface next to the *Uterus*, as is evidently demonstrated, by injecting a thin Liquor into the umbilical Vein or Arteries; for it soon comes running out every where from the exterior Surface of the *Placenta* and *Chorion*.

13. THE Mother supplies Liquors to the *Fætus*, which returns others to the Mo-
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(*a*) Ruyfch. Thes. 5. n. 41. Rouhault Memoires de l'Acad. des Sciences, 1714 & 1716.

ther by Means of the Uterine and umbilical Vessels.

This seems to be plainly proved by Observations. *Fætuses* whose *Placentæ* were not in the least separated from the *Uterus*, have been quite exhausted of Blood by the Mother's dying of a Hæmorrhagy (*a*). And I have seen Children pale and weak, by violent Flooding in the Time of Labour.

14. WHEN a *Fætus* dies, or is separated from its *Secundines* by cutting the umbilical Rope, the Circulation of Liquors is wholly stopped in the Vessels of the *Secundines*, and these become a lifeless Mass.

The Experience of our greatest Practitioners in Midwifery sufficiently proves this. They tell us that no Hæmorrhagy or Discharge of any other Liquor happens at the umbilical Vessels, upon the Navel-string's being cut or broke, after the Vessels are secured on the Side of the Child, as I have also seen frequently; and another Proof is, the *Placentæ* commonly separating in a shrivelled or suppurated State, soon after the Communication with the Child is destroyed (*b*).

When

(*a*) Mery dans l'Hist. de l'Acad. des Sciences, 1708. Heister Compend. anat. not. 36. (*b*) Mauriceau maladies des femmes grosses, livre ii. chap. 9. Ruysch. in Theſ. Observ. & Advers.

When one is to observe whether the umbilical Vessels have a Circulation of Blood kept up in them, after their Communication with the Child is stopped or destroyed, he needs scarce be desired not to mistake a few Drops of Blood, such as would come from an amputated Limb of a dead Person, for a Hæmorrhagy; but he ought to observe one Caution, which is to make sure before the Trial, that there is no *Fœtus* left with its Navel-String untied or uncut: For in the Case of Twins, when often the *Placentæ* are blended, and sometimes one Navel-string serves both (*a*) though one Child is taken away, the other may fill the Vessels of the *Placentæ*, and continue their Functions; so that a Hæmorrhagy would happen at the cut but untied Navel-string of the first Child. We have an Instance of a Mother and Child being almost wholly drained of their Blood, by the Midwife's neglecting to ty the Navel-string of the first of the Twins, which was brought forth without perceiving that the other still remained in the Womb (*b*). This Case ought to be added to the Histories brought in Proof of § 13.

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15. THAT

(*a*) Mem. de l'Acad. des Sciences, 1726. Act. medic. Berolin. Dec. 2. Vol. 6. § 4. (*b*) Histoire de l'Acad. des Sciences, 1727.

15. THAT Power which Physicians generally now-a-Days call *Absorption*, whereby the small open Orifices of Vessels imbibe Liquors lodged in the Cavities of the Body, is observed to increase or diminish proportionally to the Strength or Weakness of the Creature.

In Diseases where the Contraction of the Vessels is too great, as in most of those that are called acute, there is scarce as much Moisture in the Cavities or Interstices of the Parts, as allows them to slide easily one upon another. In Health the Quantity of such Liquors is moderate, and a pretty constant Equality is kept between the Action of the Exhalants and of the Absorbents. But when the Body turns weak, the Exhalants pour out so much more than the Absorbents can take in; that all the Cavities are found to contain considerable Quantities of Liquors. After Death the Action of the Absorbents seldom or never can be supplied by any mechanical Pressure. For Examples of what has been said concerning Absorption, consider the common *Phænomena* which are to be observed in the long alimentary Tube, in the large Cavities of the *Abdomen*, *Thorax*, *Pericardium*, &c. and in the smaller Cavities of the *Tunica cellularis* every where, of the
Cor-

Cornea, &c. both in a sound and morbid State.

Hence we may understand how Purgatives or Diureticks may serve to drain off extravasated hydropick Waters, by stimulating the Vessels to a stronger Absorption, and how Corroborants may produce the like Effect, though more slowly.

16. THE Liquors (§ 13.) are not carried from the Mother to the *Fætus*, or from the *Fætus* to the Mother by continued Canals, that is, the Uterine Arteries and Veins do not anastomose with the Veins and Arteries of the Secundines (*a*); but the Extremities of the umbilical Vein take up the Liquors by Absorption in the same Way as the Lacteal Vessels do in the Guts; and the umbilical Arteries pour their Liquors into the large Cavities of the Sinuses, or other Cavities analogous to them.

Were I allowed to illustrate the Communication between a Mother and her Child in the Womb, by a gross Comparison, I wou'd say that the Uterine Sinuses are to a *Fætus* what the Intestines are to an Adult. The uterine Blood poured into the Sinuses being analogous to the recent *In-*

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(*a*) Harvey de Generat. animal. exercit. 70. Ruysch. Thes. 3. n. 45.

gesta of Food and Drink: The Liquors sent from the umbilical Arteries to be mixed with the uterine Blood, resemble the Bile, pancreatic Juice, and the other Liquors separated from the Mass of Blood: The umbilical Veins, and those on the Surface of the *Chorion*, take up the finer Parts of this compound Mass, as the Lacteal and Mesenteric Veins do from the Contents of the Guts. And the grosser Parts of the Blood in the Sinuses are carried back by the Veins of the Womb, as the Excrements of the Guts are discharged at the *Anus*.

It is plain from the disproportionate Size of the humane Sinuses, and of their excretory Canals, to the very small extreme umbilical Vessels (compare § 5. and 9.) that there can be no Anastomosis by continued Canals supposed here, which also seems to be proved next to a Demonstration by § 14; for if the Vessels of the Secundines anastomosed, a Hæmorrhagy or Flux of some Liquors would happen at the umbilical Vein, when ever the Navel-string was broke or cut, and would continue as long as the After-burthen adhered to the *Uterus*; and if the umbilical Vessels were tied, the Circulation would still continue in the *Placenta*, and it would not become a lifeless Mass; but the Reverse of all these are observed,

observed, which makes a most sure Proof of the Communication of the *Placenta* with the *Uterus*, being destroyed as soon as the Navel-string is divided; and as § 14. shows the Secundines to owe their Life and Action to the *Fætus*; so the Reason of their taking in no Fluids, after it is separated, is evident from § 15.

In Brutes we can observe no tearing or breaking of Vessels, when we separate the *Placentæ* from their *Uteri*; and when any Liquor is injected into their uterine Arteries, none of it does pass into the umbilical Vessels, as I have many Times fully tried in the glanduliferous Animals, Cows, Sheep, &c. and in some others. In many Animals the Secundines and *Uterus* do not adhere for a considerable Time (*a*); and in some of these, Mares for instance (*b*), there is no Way for any Nourishment to be conveyed to the *Fætus*, except by the Vessels of the Secundines, which therefore can only take up their Liquors by Absorption; and why may not the same obtain in other Animals?

'Tis worth while to remark by the Way the Inconveniencies that are shunned by the Want of an Anastomosis between the

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(*a*) Fabric. ab Aquapend. de form. Fœt. Part. i. cap. 3. Needham. Obs. anat. cap. 2. (*b*) Needham. ibid. & cap. 3.

Vessels of the Womb and Secundines. The Violence of the Mother's circulating Fluids, are not in hazard of destroying the *Embryo*, while tender; and there are no Vessels to be broken or torn at Birth, which would have required too much Force in bringing away the *Placenta*, and would have brought on Inflammation, Suppuration, and other bad Symptoms.

Some Gentlemen who contend for an Anastomosis, are so sensible of these Inconveniencies, that to shun having them objected to them, they will not allow the Anastomosing Canals to be of one continued Substance, but suppose the Vessels of the *Uterus* and Secundines to be joined only *per appositionem*, which they explain to be, by the one Sort receiving the other some Way within them, in the same manner as the second Sort of Pipes receive the first in the injecting Instruments (*a*); so that the Coats of the Vessels being thus contiguous, they may serve for the Transmission of Liquors, as well as if they were of the same continued Substance, and may be separated with a small Force, and without any Laceration.

This Supposition takes off indeed the Ob-

(*a*) See Art. IX. of the first Vol.

Objection of such Inconveniencies, but is itself equally destroyed with the former, by the other Arguments used against the Anastomosis or Propulsion of Liquors from the Mother, into the Branches of the umbilical Vein; and at the same Time, exposes the Proposers of it to still greater Difficulties. They must show that the Sizes of the opposite Vessels are fitted for such an *intus-susceptio*; whereas the Disproportions of the Humane are most conspicuous; and in other Creatures, the Chances of Unfitness are much greater than those of their being rightly adapted to each other. They must name some other Instance of any thing like this being observed any where else in a Sound Creature. If they take a morbid Case, such as the Cure of Wounds by *Symphysis*, to illustrate their Doctrine by, they would do well to consider how soon the Change from contiguous to continued Vessels is made there.

Were it not to prevent any good Grounds for a Reply, I would leave the Doctrine I have advanced, to be maintained by the Arguments already used; but I know there are some particular Observations or Experiments which may be insisted on as clear Evidence against me, if I do not take off their Force; and therefore allow
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me to state such Objections with their Answers.

Mr. *Mery* (*a*) describes a Child that had no Heart, Lungs, &c. nor nothing analogous to a Heart; and therefore cannot conceive any other Force that could continue the Circulation of the Blood in this Monster, than the Motion it acquired from the uterine Arteries, which, according to him, must have inosculated with the placentary Vessels, that the Liquors might be propelled through these.

Mr. *Mery* has destroyed the Necessity of his own Supposition in the Relation of the Fact; for he tells us, That this Monster was Twin to a perfect Child, whose *Funis umbilicalis* sent off the small Navel-string of the Monster; and therefore the Heart of the complete Child would drive forwards the Blood of the Monster, at the same Time that it promoted its own Circulation, without any Necessity of Assistance from the Mother's Blood.

Mr. *Cowper* is sometimes quoted also for supporting the contrary of what I have asserted: His Words are (*b*): “ These Blood-
“ vessels of the *Uterus* are inosculated with
“ those of the *Placenta*, as may appear
“ by

(*a*) Mem. de l'Acad. des Sciences, 1720. (*b*) Anatomy of humane Bodies, Explic. of Tab. 54. F. F. F.

“ by the passing of Mercury from one to
“ the other; so that if you pour it into the
“ hypogastrick Arteries of the Mother, it
“ will pass into the Veins of the *Placenta*,
“ as well as those of the *Uterus*: And on
“ the contrary, from the Arteries of the
“ *Placenta* to the hypogastrick Veins of
“ the Mother; as also into the Veins of
“ the *Placenta*. Hence it appears there
“ is a Circulation of Blood between the
“ Mother and *Fætus*; and it seems as if
“ the Blood-vessels of both did germinate
“ and inosculate with each other. But this
“ requires too much Speculation for my
“ Occasions to admit of a further Enqui-
“ ry at present.”

I imagine that every one who reads the preceeding Paragraph, especially if he is at all acquainted with Mr. *Cowper*'s Manner of telling what he has seen, will readily judge that this Author is there asserting rather *à priori* what he thinks would happen, than describing what he really saw upon Trial. Observe only how dubious and timorous his Words are, “*The Inoscu-*
“ *lation may appear by pouring in Mercu-*
“ *ry.—It seems as if the Blood-vessels*
“ *of both did germinate and inosculate.—*
“ *This requires too much Speculation to*
“ *admit of a further Enquiry at present.*”

If

If he had made the Experiment, he would have told us that he had poured in Mercury, and after seeing it pass in such a manner, was certain such an Inosculation did obtain. So that I would believe the Reasons already given against an Inosculation, at least sufficient to counter-balance what Mr. *Cowper* has said. But to take away all Pretence for insisting on this Assertion of his as a conclusive Experiment, I injected Oil of Turpentine into the Iliac Artery of a Woman three or four Months gone with Child, on purpose to examine this Fact. The Return of the Oil by the Artery of the other Side, or by the Veins was prevented, and I pushed in the Oil, till the *Uterus* was so greatly swelled, that the Vessels seemed to be in hazard of bursting, and the Gentlemen who assisted me were of Opinion that a sufficient Quantity was thrown in for determining the Fact. When we opened the *Uterus*, the umbilical Vessels were found empty, and we neither saw any Particles of Oil, nor could be sensible of its Taste in the Pieces of coagulated Blood, scattered here and there in the Vein. Mr. *Gibson* indeed thought he smell'd the Oil in this Blood, but Dr. *John Taylor*, Fellow of the College of Physicians in this Place, and the Students of Physick who were

were present, joined with me in being sensible of no such Smell. None of us could observe one Drop of the Oil, or any Smell or Taste of it in any Part of the *Fœtus*. From the whole I flatter my self, that I have given sufficient Grounds for denying such a vague Assertion as Mr. *Cowper's* seems to be.

Mangetus (a) has recorded a much more express Experiment, which he says *Vieußsens* communicated to him. It is this,
 “ Quick-silver injected into the carotid
 “ Artery of a Bitch with Young, not on-
 “ ly ran into all her Members and Bowels,
 “ but likewise came so by the umbilical
 “ Vein into the Whelps inclosed in the *U-*
 “ *terus*, that their interior and external
 “ Parts, and consequently the whole Skin
 “ were prettily painted with this Mercu-
 “ ry running through the Blood-vessels.”

If this Experiment had been related by Mr. *Vieußsens* himself, I should have paid much more Regard to it, than in the Way it is now published; for *Morgagni* (b) has sufficiently shown how intolerably inaccurate *Mangetus* has been through the whole great Work where this Experiment is published; and Mr. *Vieußsens* has mentioned
 nothing

[(a) Theat. Anat. lib. 2. Pars 2. cap. 3. (b) Advers. Anat.

nothing of it, when he expressly treated this very Question (a): Which made me to doubt the Truth of it; and therefore I repeated it, with the Assistance of my Colleague Dr. *Andrew Sinclair*, Professor of Medicine, and of Mr. *Gibson*, in Presence of several young Gentlemen. We put a Pipe into the carotid Artery, without cutting more of the Teguments than was necessary to come at the Artery; then hang'd up the Bitch by the Neck, and poured in the Quick-silver. We chose this Method, to prevent the Mercury from running out at cut Vessels, and that it might force its Way further into the uterine Vessels, when it was thus pressed by such a high Column in this erect Posture of the Creature. We continued to pour in Quick-silver till it came running plentifully out at the *Vagina*, which was a sure Sign of its penetrating far enough for entering the placentary Vessels, if there was any Inoculation. And to give it still a greater Chance of entering the umbilical Vessels, we tied the *Vagina* firmly, and continued to pour in Mercury at the Carotid. When we opened the Bitch, we saw the Vessels of the *Uterus* and its *Cornua* very turgid with Quick-silver.

(a) In System. Vaso.

ver. The Body of the *Uterus* and the right *Cornu* contained no *Fætus*, but were distended with extravasated Quick-silver. There was one Whelp contained in the left *Cornu*, which was taken out and laid on a Plate, after being well tied above and below where the *Fætus* was lodged. When this *Cornu* was cut longitudinally, the *Placenta* separated from it most easily; and as they separated, the Mercury run out plentifully from the Vessels of the *Cornu*, but not a Drop appeared in, or drilled out of any Vessel on the exterior Surface of the *Placenta*. After the *Amnios* was opened, there was no Mercury to be seen in the *Fætus* or the umbilical Vessels, tho' we could trace these to their very minute Branches on the Membranes. When the Secundines had been handled some Time, and the *Amnios* was turned outermost, some exceeding small and short Streaks of Quick-silver appeared under that Membrane; but not being contained within any thing like the Coat of a Vessel, Dr. *Sinclair* and I judged them to be no other than some Drops of the Mercury, which we had seen stick to the outer Surface of the *Placenta* when they fell from the *Cornu*, that had been pressed by Handling into the small Interstices of the placentary Substance:

And

And therefore concluded, that no Mercury had passed from the *Uterus* into the umbilical Vessels.

Though I think this § 16. sufficiently proved, yet to shorten hereafter the Dispute concerning the Nourishment of a *Fætus*, I may remark, that it will be sufficient for my Purpose in the present Question, to have Part of the Vessels of the *Secundines* granted to be Absorbents (the Negative of which, I dare affirm, no body will undertake to prove) though others were found to be continued, or to inosculate with those of the *Uterus*.

17. THE *red Particles* of the Blood are not probably absorbed by the small Extremities of the umbilical Vein.

My Reasons for thinking so are : The Smallness of the Orifices of these Vessels ; the chylous Appearance of what is separated by the *Glandulæ* of Cows and Sheep ; and the want of an Example of red Globules being absorbed any where else.

If it should be asked, whence then has the *Fætus* red Blood ? I answer, without entring upon any philosophical Comparison of the *Placenta* in a *Fætus* and of the Lungs in respiring Animals, that *Fætuses* of viviparous Animals have their red Blood from the same Source that Chickens in O-

vo have theirs ; which can be no other than the Action of their Heart and of the Vessels in their Body and Secundines.

If it should be further objected, that the Instances mentioned § 13. of Children being exhausted of Blood by *Hæmorrhagies* from the Mother's Vessels, shew the red Globules to be sent out from the Secundines into the *Uterus* ; and therefore probably such are taken in ; the Answer is ready, *viz.* That these Instances prove the Loss of such red Particles no more, than the wan Colour, Faintness, and the Emptiness of the Vessels in a violent *Diarrhæa*, are certain Signs of bloody Stools ; which none will affirm they are.

18. THE *Placenta* does not increase in the same Proportion which the *Fætus* does, for the smaller the *Fætus* is, the *Placenta* is proportionally larger (*a*).

19. THE smaller Share by far of the Blood sent out by the umbilical Arteries is returned to the *Uterus*, most of it being poured into the umbilical Vein by anastomosing Canals.

This may be seen by injecting Liquors into the umbilical Arteries of any Creature.

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ture.

(a) Ruysch. sparsim.

ture. *Rouhault* (a) calculates, that only one seventh Part of the capillary Branches of the humane umbilical Vessels reach the exterior Surface of the *Placenta*.

20. THE progressive Motion communicated to Liquors by the Power of Absorption being slow and weak, and no external alternate Pressure having a considerable Effect in increasing the *Momentum* of the Liquors moving in the Vessels contained within the *Uterus*, it would appear that the Blood returning to the *Fætus* is pushed forward principally by the Force of the Heart and Arteries of the *Fætus* itself.

That the Force of the Heart may be strong enough to drive forward the Blood in such a long Course as it must make in the *Secundines*, the *Canalis arteriosus* is sent from the pulmonary Artery into the descending *Aorta*, whereby the Blood thrown out by the umbilical Arteries is propelled by the united Force of both right and left Ventricles of the Heart, and these Arteries anastomose with the Branches of the umbilical Vein by larger communicating Canals than the Arteries and Veins commonly have in other Parts of the Body.

21. IN the greater Number of Animals
that

(a) *Mem. de l'Acad. des Sciences*, 1755.

that have hitherto been carefully examined, the *Allantoid* Membrane with its contained Urine has been found (*a*).

22. THE *Allantois* of some Animals (*Mares, Bitches, Cats,*) furrounds the *Amnios*, being every where interposed between it and the *Chorion*. In others, (*Cows, Sheep, Goats,*) the *Allantois* incloses a considerable Share of the *Amnios*. And in others (*Swine, Rabbits,*) it is confined to a small Space (*b*).

23. AT those Places where the *Allantois* is not interposed between the other two Membranes of the *Fœtus*, the *Chorion* adheres to the *Amnios* by a very fine cellular Substance, which easily yields to any stretching Force, as every one must see in examining the *Secundines*.

24. THE *Amnios* has numerous Ramifications of the umbilical Vessels spread upon it (*c*), the Orifices of the lateral Branches of the Arteries pouring out Liquors into its Cavity.

Injections plainly discover this; for after injecting a thin Liquor, Water for Example, into the umbilical Arteries, dry the interior Surface of the *Amnios* well

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with

(*a*) Needham. Observ. anat. de form. Fœt. cap. 3. (*b*) Id. ibid. (*c*) Id. ibid. Cowper Anat. of hum. Bodies, Explic. Tab. 59. A. A.

with a Cloth; then press the Membrane gently, or continue the Injection, and the Water is seen coming out on that Surface, in the Form that we see small Drops of perspirable Matter come out on the Surface of the Skin at the Finger Points, when we press the Finger hard, or have tied a String round it. I have many times repeated this Experiment, and always with Success.

25. SEEING we can demonstrate Veins also on the *Amnios*, and seeing the Veins of all other membranous Bags that have arterious Canals throwing Liquors into their Cavity are endowed with an absorbing Power, and take up Fluids from the Cavity, we may conclude that the Veins here are the same Way employed.

26. THE Liquor contained in the *Amnios* is either wholly separated from the Vessels of that Membrane, or it is furnished partly from them, and in Part from the *Fœtus*.

In the Creatures whose *Amnios* is every where inclosed by the *Allantois* (§ 22.) it is impossible this Liquor can be transcolated from the *Uterus* or its Cavity, thro' all the Membranes into the Cavity of the *Amnios*, because if the *Allantois* could allow a Passage to such a Fluid, its own Contents would necessarily go along with it, which

which every one will confess would be of bad Consequence; but the Truth is, That the *Allantois* does not allow Liquors to pass through it. In those Creatures where the *Allantois* only surrounds Part of the *Amnios*, if we did suppose the *Chorion* and *Amnios* capable every where else of serving as Strainers, the Liquor would always be found in considerable Quantity in the cellular Substance between them (§ 23.) which it is not; and what should hinder it to run out as fast as it could be conveyed in?

Let none here assume Canals having Orifices opening on the Surface of the *Chorion*, and sent directly into the Cavity of the *Amnios*, unless he undertakes to demonstrate them.

Harvey's Observation (*a*) of this *Liquor Amnii* being seen in large Quantity before the *Fætus* is formed, may probably be objected to me as a sure Argument of its being derived from some where else than the umbilical Vessels, or Surface of the *Fætus*; and that can only be from the Cavity of the *Uterus* by Transcolation.

I might refuse to answer this Objection, upon the Declaration already made, concerning *Alcmaeon's* Opinion of the Nourish-

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ment

(a) De generat. animal. exercit. 56.

ment of the *Fætus* while it is a-forming; namely, That the formed *Fætus* is only the Subject of the present Question; but there is no Occasion to use this Screen; for all that can be made of *Harvey's* Assertion, is only this Negative, That he did not see a *Fætus* in the very small Conceptions he examined; but it is very evident from latter Observations (*a*), That the *Rudiments* of the *Fætus*, and its *Funis umbilicalis* may be seen much sooner, and while the Conception is less than what he determines it to have been in the Cases where he says he could not see it; and, in my Opinion, *extra-uterine Fætuses* prove clearly that the *Embryo* is always lodged much sooner in its *Secundines* than we can well discern the different Parts of these; far less need we expect to be able to distinguish the different Parts they contain. I shall readily allow that the *Liquor Amnii* is in larger proportional Quantity, the younger a Conception is: And the Reason of this Appearance may very easily be understood from what was said concerning Absorption (§ 15.) From the Observation itself, compared

(*a*) Compare *Harvey's Exercit.* 15, 16, 17, with *Malpighius de ovo incubato* in the first three or four Days of Incubation, and his *Exercit.* 56. with *Kerkring. Anthropogr. Ichnogr. and Ruyssch. Thes.* 6,

ed with what is above in this Section, I would infer that the Vessels of the *Amnios* furnish by much the larger Share of the Liquor contained in it.

N. Authors having differed widely concerning the Quantity and Quality of the *Liquor Amnii*, and my Observations not having been universal enough to fix a general Rule, I shall delay any Enquiry into the State of this Liquor, till I come to examine it as it is employed in accounting for the Nutrition of a *Fætus*, where I shall consider it, according to all the different Opinions of Authors.

27. As soon almost as we can observe any *Embryo*, its umbilical Vessels discover themselves (*a*).

28. THE Mouth, Lips and Cheeks of *Fætuses* are at first wanting, and leave a large Chasm instead of a Mouth, which is gradually contracted by the Formation and Conjunction of these Parts, till it is brought to a due Size (*b*).

29. WHILE *Fætuses* continue in the Womb, their Muscles are ordinarily left to act only by their natural Contraction, or the *Fætus* is said to be in a sleeping State; but sometimes, when its Ease or Preservati-

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on

(*a*) Harvey Exercit. 56. Ruysch. Thes. 6. & sparsim. Riolan. Anthropograph. lib. 6. cap. ult. (*b*) Harvey ibid.

on requires a Change of Situation, it seems to perform some voluntary Motions, which are called its *Stirrings*.

The Posture of a Child is owing to the Muscles being left to their natural Contractions, the stronger ones always prevailing, till their Antagonists exert such a Resistance by being stretched, as brings them to an *Equilibrium*; no Wonder therefore, that the Spine is so much bowed forward, and the Head is bended towards the Knees: The Thighs are brought forward; the Legs are bended back; the Arms hang down, but are drawn a little forward; the Fore-arms, Hands and Fingers are all bended, and thereby the Hands are placed round the Knees: For it will appear to any who shall take the Trouble to consider the Structure of these Parts, that the Members are all brought to that Side where the Muscles have an Advantage over their Antagonists in Number and Strength, or in the Angles of Insertion, or in the Length of the Lever they act with.

That the Posture above described arises from the natural Contraction of the Muscles, while the *Fætus* is in a sleeping State, is farther evinced, by observing how much Children sleep after they are born, and how
the

the Members naturally go into near the same Posture when People fall asleep.

30. THE Stomachs of the youngest *Fætuses* we can dissect are full of a mucous Liquor, which remains of near the same Consistence all the Time of Gestation, except that it becomes gradually somewhat more viscous as the *Fætus* increases.

This has obtained in all the different Animals I have had occasion to dissect.

31. THE small Guts of *Fætuses* are full of a glairy mucaginous Liquor, which becomes thicker and darker coloured as it descends to the Great Guts, where it is collected under the Name of *Meconium*.

32. FOETUSES increase proportionally less the longer they continue in the Womb.

Mauriceau (a) pretends to determine the proportional Increase of a Child to be sixty four times its own Weight in triple the Time. The Numbers he condescends on are the following: At Birth, a Child weighs 12 Pounds, of 16 Ounces each; at three Months, it weighs 3 Ounces; at one Month, three fourth Parts of half a Drachm; and at ten Days, less than half a Grain.

Having now established the necessary Facts, I design to use them hereafter as so many

(a) Des maladies des femmes grosses, liv. I. chap. 5.

many Axioms or *Data*; and to save Repe-
titions, I shall only refer to them by the
Numbers prefixed to each, in the Solution
of the several Problems, to which I now
return.

P R O B L E M I.

*How far the Mouth or the umbilical Vef-
sels are necessary to the Nourishment of
Fœtuses.*

AUTHORS have all known that *Fætufes*
have been brought forth without
Mouths; but several of these Monsters be-
ing found, upon a stricter Examination, to
have some other Passage leading from the
Surface of their Bodies into their Stomachs,
several Writers of good Account have af-
firmed, or, at least, in an indirect way have
insinuated, that such vicarious Passages are
never wanting when the Mouth is shut or
deficient; which they think rather a
stronger Proof of the ordinary Canal by the
Mouth in compleat *Fætuses* being altoge-
ther necessary for the Nourishment of the
Fætus, than if no such Monsters had been
seen, since, say they, we hereby see how
careful Nature is to preserve a Passage from
without into the chylopoietick Organs.
To

To remove all Pretences for concluding hereafter so generally that a vicarious Passage is never wanting, allow me to point out some Authors, who give accurate and well vouched Histories of Monsters who had no such Canals, and in some of which it was impossible they could have them, or they must have been altogether useless.

Children (*a*), a Whelp (*b*), and a Lamb (*c*), were brought forth without Heads, or any Passage into the chylopoietick Bowels. In other *Fætuses* that had Heads, all Passage to the Stomach was shut up: See such Observations of Children (*d*), of Whelps (*e*), of a Lamb (*f*), of a Pig (*g*). And where the Passage into the Stomach has been open, there have been no Intestines (*h*). And where the Guts were, nothing could get down into them (*i*).

These Examples are so exact in showing the little Necessity there is for either Mouth or chylopoietick Organs in the Nourishment of *Fætuses*, that I need scarce menti-

(*a*) Two by Littre Mem. de l'Acad. des Sciences, 1701; one by Mery, ibid. 1720. (*b*) De Graf. de mulier. organ. cap. 15. (*c*) Antoine Hist. de l'Acad. des Sciences, 1703. (*d*) Littre Mem. de l'Acad. des Sciences, 1701. Buchnerus Act. med. physic. Acad. n. c. Vol. 2. Obs. 96. (*e*) Littre Hist. de l'Acad. des Sciences, 1703. Brady Phil. Transf. n. 304. (*f*) Ruysch. Thes. 4. n. 55. (*g*) Bellinger. de Fæt. nutr. chap. 9. (*h*) Lemery Hist. de l'Acad. des Sciences, 1704. (*i*) Calder, Medical Essays, Vol. 1. Art. 14.

mention how much they serve to determine the first Part of this Problem; and they make Remarks on the Histories of *Fætuses* who had the vicarious Passages, unnecessary; only allow me to caution the young Physiologists, not to take some Authors Assertion, of the Food being conveyed by those extraordinary Canals, for an established Truth, till they have examined what is to be said for and against it.

Tho' the former Part of the Problem should be determined in the Manner I have argued for, which takes away all Probability of Nourishment being furnished to *Fætuses* by the Mouth alone, yet the Gentlemen who are of Opinion that it is conveyed by both the umbilical Vein and the Mouth, endeavour to resolve the latter Part of it, so as still to favour their Sentiments; for they undertake to prove that the Supply by the Navel may be wanting, as well as that by the Mouth; and therefore that both contributing towards the Nourishment in the natural State of the *Fætus*, whenever one of them is wanting, the other performs the Function of both, as is sometimes done in other Parts of the Body. I acknowledge great Probability in this Reasoning, if they can bring a clear convincing Proof of *Fætuses* subsisting and increasing without receiving Liquors

quors by their Navel-string. Seeing then this Part of the Problem is of such Importance in the present Question, I must be excused for insisting particularly on the several Facts which I have observed to be advanced by Authors in Proof of the Navel not being indispensably necessary toward the Nourishment of a *Fætus*.

THE first Argument used by the Gentlemen of the other Side of the Question, is, That Authors of the best Character (*a*), who have dissected *viviparous* Animals with young, assure us there is no Adhesion or Connection between the Secundines and *Uteri* of most Animals, for a considerable Time after the Conception is lodged there; and in some Animals, many Months pass before there is any Adhesion (*b*); therefore, say they, the *Fætus* can receive nothing all this Time from the Mother by the umbilical Vessels, and consequently is then wholly nourished by the Mouth.

On the Supposition that the uterine Vessels must always inosculate with those of the Secundines, before the umbilical Vessels can receive any Liquors from its Mother, this Argument is indeed of great Force; but according to the Scheme which

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(*a*) Harvey, Needham, de Graaf. (*b*) Needham, Obs. anat. de form. Fœt. cap. 2.

I have explained, and, I hope, have proved in § 13. — 16. of preliminary Facts, it is a Matter of Indifference whether the Liquors furnished by the Mother, are applied to the bibulous Orifices of the absorbent Vessels of the Secundines, while the Liquors are contained within Cells formed in the Substance of the *Uterus*, (§ 2. — 5.) or when they are poured into the Cavity of the *Uterus* itself; for those Vessels will equally well perform their Office in both Cases, and thereby serve to nourish the *Fætus* sufficiently; which must take off the Necessity we were here imagined under, of supposing the Food to be wholly received at the Mouth. Nay in some Animals, for example *Mares*, whose *Allantois* surrounds the *Amnios* (§ 22.) and whose Secundines have no Connexion for a considerable Time with the *Uterus*, what has been just now said is finely illustrated, and there is downright Demonstration of all the *Fætuses* Nourishment being conveyed by the umbilical Vessels, as was remarked, § 16.

NEXT, several Observations are brought to show that the Passage of Liquors by the Navel, has often been stopped long before Birth; the first I shall mention is one of Mr. *Petit*, “ Mr. *Petit*, (says the Secretary
“ of

“ of the Academy of Sciences (*a*) caused
 “ the Navel-string of a humane *Fœtus* to
 “ be shown, which had a Knot in its mid-
 “ dle, where one could observe the Marks
 “ of the Contiguity (*d'Attouchement*) of
 “ the Parts that formed the Knot; which
 “ proves that the Knot had been made
 “ long before the Woman's Delivery.”

It may be said that this is in some Measure answered by what *Mauriceau* (*b*) *De-venter* (*c*), and other practical Writers in Midwifery affirm of the Danger Children are in of losing their Lives, when the umbilical Rope is pressed or exposed to the cold Air before Birth; and by Observations of *Fœtuses* being killed by Knots on the Navel-string (*d*): But the Fact as it is told, is open to stronger Objections; for there is not one Circumstance mentioned by which we can know whether this Knot stopped the Course of the Blood, or if it was any more than one of the common ones, about which some Midwives make so much to do. I have sent you a Figure of one, serving to show you, by my Injections passing, that Liquors will not stop in
 such

(*a*) Hist. de l'Acad. des Sciences, 1718. (*b*) *Maladies des femmes grosses*, livre 2. chap. 26. (*c*) *Ars obstetric.* cap. 38. (*d*) *Ruyfch. observ.* xi. *Gutterman in Commenc. Norimberg.* 1731, Semest. 1. Spec. 20.

such (*See Tab. I. Fig. 5. representing a Piece of the Funis umbilicalis, whose Vessels are distended with Wax.*) A A is the large Vein; B B, the two Arteries twisting spirally round the Vein; C, a very remarkable Convolution of the Arteries, which resembled a Knot, before the Injection was thrown in. Further, I see no Reason to conclude from Mr. *Petit's* Observation, as the Secretary has done, that because there were Marks of the Parts which composed the Knot, touching or being contiguous to each other; therefore the Knot must have been of old standing. Add to all this, That there is no Mention made of the Child's Condition, whether it was born dead or alive: So that from the whole I must think there can be no Use made of this Observation in this Argument; and I must also acknowledge, that the Observations of Children said to be killed by Knots on the Navel-string, are as little to my Purpose; for tho' the Authors who relate them do aver the Knots to have been the Cause of Death, yet they do not mention Circumstances in the Fact, sufficient to support their Opinion, for which I must decline the greatest Authority, though it was ever so favourable to my Side of the Question.

THE second Observation brought to prove the Course of the Blood interrupted in the umbilical Vessels before Birth, is what Mr. *Heister* (a) quotes from *Fred. Hoffman's* Dissertation *de Pinguedine*. Unluckily that Treatise is not among the Collection of *Hoffman's* Dissertations I am possess of, and therefore I must take the Fact at second Hand; it is this, “ A perfect Child was born, whole umbilical Rope was all corrupt and putrid (*Putredine totus corruptus erat.*) Mr. *Heister* adds, It would have been impossible that it should have lived, unless it had taken its Nourishment some other How than by the Navel.”

Though for ought that is expressed here by either *Hoffman* or *Heister*, it seems to be ambiguous, whether this complete Child was born dead or alive, yet I shall suppose the latter Case; and when this is granted, the Account is such as one cannot pretend to guess from it how long this Navel-string had been corrupted; what Parts had been destroyed by the Putrefaction; whether the cellular Membrane, and *Mucus* of the Rope only were affected; or if the Vessels involved in them were al-

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so

(a) Compend. anat. not. 37.

so destroyed. In short this Story does not seem distinct enough to allow any Consequence to be drawn from it. Lest however any should build on a strict Sense of the Word, *TOTUS*, which *ALL the World* knows is generally used in a very vague Way, let such reconcile any Appearance of a *funis umbilicalis*, with the total and compleat Corruption of the Membranes, *Mucus*, and Vessels composing it.

THE two following Histories are much more exact and to the Purpose: One is from *Chatton* (*a*); the other is by *Petrus Rommelius* (*b*). Both agree almost exactly in the principal Circumstances. Healthy Children are born with the Navel skinned over. The Secundines, when afterwards brought away, are of a natural Size, and the Extremities of the umbilick Rope are coalesced. The Mother of the one told Mr. *Chatton*, that she had gone with Child three Weeks longer than her ordinary Time; and he thinks the Navel was as found as a Child three Weeks old used to have it. *Rommelius* judges the other Child's Navel to have been as found as in Children several Months old. A small little impervious Process about the Size of a
Worm

(*a*) Vander Wiel Observ. cent. post. pars 1. not. in Obs. 32.
 (*b*) Ephemerid. German. Dec. 2. Ann. 7. Obs. 209.

Worm stood out from the Navel, and the umbilical Rope was as small as a Goose-quill.

These Authors have been very fond of setting the World a-staring, otherwise they would never have made the Comparisons of the Soundness of the Navels of the Children in their Histories with those of Children so many Weeks or Months old. I wish they would explain to me what is the Difference as to Soundness in a sound Navel of Children three Days, Weeks, Months or Years old. Since there is none, we are to inquire how long Time these Navels had probably been in skinning over after the Navel-string was broke or eroded. The Circumstance of the Secundines being of a natural Size shows, that this Accident did not happen long before Birth; for from what was said in § 14. of the *Placenta* being a lifeless Mass after the Communication betwixt it and the Child is destroyed; and from what the best and most experienced Practicers in Midwifery (*a*) agree in, the Size and State of the After-burden must be greatly changed in very little Time, after it is in that lifeless State which must be here supposed. The only Way of judging in

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what

(*a*) Mauriceau *Maladies des femmes grosses*, liv. 2. chap. 2. Ruysch. in *Theat. Observ. Advers.*

what Time a Skin might be brought on the Navel of the Children mentioned in the foregoing Histories, is, to determine how soon after Birth Childrens Navels are skinned over ; and then to inquire, whether a Cicatrice would be sooner or later brought on by the Child's continuing immersed in its Waters after the Navel-string was broke. I have frequently seen, and among the rest in my own Children, the tied Piece of the Navel-string fall off, in four, three or two Days after Birth ; and the Skin was found where the shrivelled String separated ; and you probably know how very soon the Remains of the Navel-string drops off from Brutes. If then such a Separation can be made so soon, when dry Rags are applied, or by being exposed to the Air, we have Reason to think that the Skin would be much sooner brought on the Navel, while the Parts were soaking in the *Liquor Amnii* ; for we have very convincing Proof what the Effects of such a Salt Liquor is in the *Saliva*, which not only serves to keep the Mouth soft and flexible, but very soon heals Wounds or mild Abscesses there ; the Urine will scarce allow Surgeons to keep the Wound in *Lithotomy* long enough fresh, but notwithstanding their utmost Efforts, often renders the Passage callous.

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The *Synovia* of the Joints, the glary Liquor of tendinous or ligamentous Sheaths; and in short, all such Liquors of our Body do the same. From all which I would conclude, that the Navel-strings, which are the Subject of our present Enquiry, were broke very soon before Birth; and if I should allow the Time to have been a Day or two, the *Fætus* might continue so long in Life, without any new Supplies of Nourishment, as well as it does several Days after Birth, when it ordinarily takes only some purgative Syrupes; and you have recorded (*a*) an Instance of a Child that lived seven Days after Birth, though nothing could pass out of its Stomach into its Guts to nourish it. The Probability of a Child's living without Nourishment in the Womb so long as I have allowed, is certainly much greater than that it should continue in Life, Days, Weeks, or Months after the Waters have been evacuated, and continued to be constantly discharged (*b*), on the Supposition which the Gentlemen of the other Side make of its receiving its Food mostly by the Mouth for some Time before Birth. I would therefore conclude from the whole, That these Children, whose Histories *Chat-*

(*a*) Medical Essays, Vol. I. Art. 14. (*b*) Mauriceau dans plusieurs Observat.

ton and *Rommelius* relate, were under no Necessity of being supplied with Nourishment any other Way than by the Navel, and consequently do not prove what was designed by appealing to them.

A MORE direct Proof of the umbilical Vessels not being so necessary as I argue for, is offered by Examples of *Fætuses* who had no Navel-string. I know only two Cases where this is alledged; one is told by *Vander Wiel*; the Author of the other is anonymous.

Vander Wiel says (a), “ In the Time
 “ of the Fair at the *Hague*, in the Year
 “ 1683, a Male Child, a Year and three
 “ Months old, born of poor Parents in
 “ *February* 1682, was exposed for a Shew,
 “ When it was born, there was not the
 “ least Vestige of the umbilical Rope, and
 “ therefore the Midwife had no Occasion
 “ to separate it from the Child’s Belly.
 “ The Navel also was wanting; but in-
 “ stead of it, a broad round red Spot, as
 “ large as a *Stiver* Piece of Money, co-
 “ vered with a very thin Skin, appeared
 “ in the *Hypogastrium*, near to the Share-
 “ bones; within the Circumference of
 “ which Spot, two *Papillulae* or Aquæ-
 “ ducts

(a) *Observ. Cent. post. pars 1. Observ. 33.*

“ ducts were seen, at an Inch Distance
“ from each other, by which the Urine
“ was evacuated. The Child died at three
“ Years of Age.” In the Notes upon this
Observation he tells us, its Body was not
opened after its Death.

This seems to me such a History, as one
can rely very little on; for it would ap-
pear to be on the Parents Information that
Vander Wiel asserts there was no Navel-
string; their Business to be sure was to
make the Case as wonderful as they could,
to draw in Customers. There is not any
where mention of Secundines, to know
whether the umbilical Rope was hanging
at them; and the Breadth of the Spot an-
swers very well to the Navel; which pro-
bably would have been made as certain by
a Dissection, as it was conspicuous in ano-
ther Case related towards the End of the
Notes upon this Observation, and very like
to it in all the principal Circumstances, ex-
cepting that here the umbilical Rope was
evident. Since then this History is so im-
perfect, and on a Hearsay, while the very
Case which the Author tells as analogous
to it, brings it to make for my Side of the
Question, I am hopeful it will not be ad-
vanced any more against me.

The second Case of a Navel being want-

ing, is told in a Letter of an anonymous Author in Words to this Purpose (a): “ A
“ Hare big with young being caught, its
“ Belly was carefully opened, and imme-
“ diately three considerable Balls tumbled
“ out ; they were of a whitish Colour ex-
“ ternally, with this Difference, that the
“ Coat of the first which fell out was not
“ pellucid, whereas the other two were
“ furrounded with a pellucid Coat. I con-
“ sidered these Globes accurately, and
“ could not observe on their Surface the
“ least Mark of their adhering any where.
“ I also with great Care examined the U-
“ terus that was cut out, which I found
“ perfectly intire, and of a natural Size,
“ without any Marks of a Conception, or
“ of any Breach in it. When I had cauti-
“ ously cut these Globes or Balls, I found
“ in each a little Hare covered all over
“ with Fur, and of the Bigness new kittled
“ Hares commonly are. The Membranes
“ furrounding them were easily taken off
“ whole and intire ; but I could find no
“ Vestige of the umbilical Rope either in
“ the separated Membranes or Bodies of
“ the Hares. After this I viewed the Mem-
“ branes more exactly, discovering them
“ to

(a) *Commerc. literar. Norimberg.* 1731. Spec, 27. Art. 4.

“ to be double and easily separable. In
“ the Ball whose Membranes I said were
“ opack, the external one was thicker ;
“ the one within this was thin and pellu-
“ cid, its internal Surface being covered
“ with a yellowish *Mucus*. Internally
“ there was a Space about the Bigness of a
“ *Gulder-piece* of Money, that resem-
“ bled a small uterine *Placenta*, equally
“ covered with a thin Skin, but without
“ any Vestige of the umbilical Rope. I
“ cut the *Placentulæ*, and found them in-
“ ternally Liver-like, (*Hepatifformes*) whi-
“ tish, of a soft vascular Texture, full of
“ Canals and *Papillulæ*. These are what
“ were partly faithfully related to me, and
“ partly were observed and remarked by
“ my self. Indeed having never had an
“ Opportunity, I did not search into the
“ *Fætuses* of Hares before. This whole
“ Matter seems a Paradox to me.”

Many Inconsistencies discover them-
selves in this Observation at first Reading,
even in the Part of it where one would
think the Author is telling what he saw.
Two of the Balls are pellucid, and the third
has only a round Spot on the interior Sur-
face of its Membranes, which he seems
wisely to expect should have had umbilical
Vessels coming out from it, and is much
disap-

disappointed at missing of them : After, I say, he has thus made it evident, that there were no *Placentæ*, yet afterwards hepatic-form vascular *Placentæ* are very accurately described. — The Membranes are taken off whole and intire from the *Fætuses* inclosed in them, after the Globes containing the *Fætuses* had been cautiously cut. — The *Placentæ* are *Hepaticiformes*, either from their Shape, Form and Bulk, being before invisible ; or they are like Livers, because they are white. — Though it is now agreed, that a *Placentæ* is no more than numerous Ramifications of the umbilical Vessels, yet here are *Placentæ*, without their Vessels being derived from any Part ; which to me appears to be an expresse Contradiction and Impossibility. — Though the whole Affair is a Paradox to him, he has not the Curiosity to open one of the young Hares, that he might see whether the umbilical Vessels were wanting within their Bodies as well as without.

Though this Gentleman has concealed himself in a Country where People are far from shunning to be the first publick Tellers of such Prodigies of Nature as come to their Knowledge, yet I shall not doubt of his Sincerity ; but cannot help saying, that
his

his Ignorance, at least in the Structure of the *Fætuses* of Hares, which he says he never had an Opportunity of dissecting before, has led him into Mistakes numerous enough to give me sufficient Cause to decline his Testimony. And as to the principal Thing which relates to the present Question, the want of a *Funis umbilicalis*, I think I can, with the Help of *Needham's* third Table of his Observations *de Form. Fæt.* make an Apology for his not discovering it, by showing that others, more accustomed to the Dissection of Hares, might have missed of it as well as he. *Needham* represents the *Fætus* of a Rabbet with its Secundines (which differ scarce any thing from those of a Hare) where that Part of the umbilical Rope in which all the Vessels are inclosed, is very short, and six considerable Branches go from it separately to the *Placenta*. If these Vessels were all broke at the Place where they separate, by the running of the Dame, or falling out of the Balls, or in opening the Membranes, the short Navel-string would contract, and be hid by the Fur, so as to be discovered with Difficulty; and the Extremities of the six broken Vessels would appear on the *Placenta* like *Papillulae*, and the *Placenta* would be vascular and whitish

tish coloured, as the anonymous Observer has described it. This Account is natural and easy enough to bear a strong Air of Truth with it.

IF then accurate Instances are recorded of *Fætuses* being nourished without any Possibility of their receiving Aliment by the Mouth, or into their *chylopoietic* Organs; and if there can be no distinct unexceptionable Proof made out of their being ever supplied with Nourishment without the Navel-string, I must determine the first Problem, by affirming, *That the umbilical Vessels are absolutely necessary towards the Nourishment of a Foetus; and that the Mouth is not so.*

P R O B L E M II.

Whether the Liquor contained in the Amnios is proper Food for a Foetus.

WHEN we consider this Liquor as it is sometimes represented, to wit, that it is at first mild and mucaginous, and afterwards becomes thinner, more acrid and urinous, it would appear ill calculated for the Food of the *Fætus* in its different States: For while the Parts of a *Fætus* are weak, and have little Action, they are not
so

so well fitted for digesting and breaking the Cohesion of a Fluid, whose Particles separate with such Difficulty; whereas it would have been much more capable of digesting stronger Food after its Stomach, Guts and other *chylopoietic* Organs were become stronger; consequently this Liquor ought to have been of the reverse Consistence to what is above described, as we see happens in a Case which must be allowed to be very analogous to the present Subject, that is in the Consistence of Milk, which is at first thin and purgative, but afterwards becomes thicker and stronger Food.

Needham may perhaps be said to have described this Liquor really to be as I have argued it should have been formed; for he tells us (*a*), “ That the Liquor of the *A-*
 “ *mnios* becomes considerably thicker than
 “ it was at first in the larger Animals:” And in another Place (*b*) he affirms, “ That it
 “ gradually becomes thicker, and soon ac-
 “ quires the Consistence of the White of
 “ an Egg; nay, in the last Months of a
 “ Cow’s going with Young, it is thicker
 “ and more viscid than any Gelly.” This agrees exactly with what I also remarked in Cows, whose *Fætuses*, with their *Secundines*

(*a*) Observ. Anat. de Form. Fœt. cap. 3. (*b*) Ibid. cap. 5.

cundines I have examined in a great many different Ages. But neither in this View of the Consistence of this Liquor does it appear proper Nourishment; for according to the old Adage, *Est modus in rebus*, though the Food of a *Fœtus* might be expected to be grosser in the last Months, when its Organs are stronger than soon after Conception, yet a Liquor so very thick and viscid as *Needham* describes, would be altogether indissoluble, and very improper for nourishing a Creature whose Organs of Digestion are still in a tender State, and for whom Nature has provided such a dilute fine Liquor as Milk is, to serve for Food a considerable Time after Birth, when all its Parts are become much more robust and strong. If we can make any Judgment in this Affair, from a View of the ordinary Course and Tenor of Nature, we must think that if the *Liquor Amnii* had been designed to be swallowed for Food, it would have been at first a thin *Serum* that gradually came afterwards near to the Consistence and Nature of Milk; but this I never saw, nor do I know that any has affirmed this Liquor to have been ever observed of such a proper Consistence in the different Times of Gravitation; and therefore must conclude that it is not designed to serve for Food.

THE *Liquor Amnii* seems not only thus improper Food, while it is in a natural State; but there are Examples of its being so much depraved, that it must have been of the worst Consequence to the *Fætus* to have fed upon it. Such is the History related by Dr. *Bellinger* (a), of a Woman who had laboured under a virulent *Gonorrhœa* during her Pregnancy, of which she was cured a very little Time before her Delivery. The Waters were very putrid and fetid, and the Membranes tender and almost rotten; yet the Child was born well and healthy, which the Doctor thinks could not well have happened, if this Child had received such putrid Waters into its Bowels.

The Force of this Observation is attempted to be taken off, by remarking, That Poisons, and other noxious Substances do less Harm when taken into the Stomach, than when immediately mixed with the Blood. Every Body I believe will grant this to be true, if the Quantities received both Ways are equal: But it is of no Use in the present Question, unless this other Proposition is also proved, *viz.* That such a Quantity of this putrid Liquor, as will
be

(a) Tract. de Fœt. nutr. chap. 9.

be sufficient to nourish the *Fætus*, must be taken in either by the Mouth or umbilical Vessels; then indeed by a plain syllogistical Consequence it follows, that such a Quantity of the putrid *Liquor Amnii* will do less Harm, by being received at the Mouth, than if it had been conveyed by the Navel. I can however see no Reason to allow the *minor* Proposition to be true; nor am I sensible of being brought, by a Denial of this Proposition, under a Necessity of giving the *Placenta* a Faculty of separating the pure from the impure, or of having the Goodness to send the impure to the *Amnios*, where it does no Harm, and the pure to the *Fætus*, where it does much Good. I presume every one's Practice has taught him, that there is no Necessity to suppose the whole Mass of the Mother's Blood to have been tainted by the virulent Matter of this *Gonorrhæa*. I can imagine this Disease to have had its Seat at first in the *Vagina*, and then to have attacked the the internal *Os Uteri* and the *Mucus* with which it is commonly filled in the Time of Pregnancy; (See an Instance of an ulcerated *Os Uteri* from such a Cause by Des Noves (a),) and this corrupted *Mucus* might

(a) Morgagn. Advers. Anat. 4. Animad. 40.

might communicate its *Fætor* to the Liquor of the *Amnios*, without the Vessels of the *Placenta* having received one Drop of this putrid Liquor; and therefore, according to the Doctrine which I endeavour to support, the Child might remain healthy and sound, unless the Waters had been long enough acrid to affect the Surface of its Body; whereas, had such putrid Liquor served it for Food a very short Time, it scarce could have escaped without some Disease. Nay from what was said concerning the Source of the *Liquor Amnii* being either the *Fætus*, or its umbilical Arteries, (*vid.* § 24. and 26.) it necessarily follows, that the *Liquor Amnii* in this Case could not have been corrupted in any other Way than what I have just now assigned; for we can never imagine that a sound Child could have such corrupted Liquors circulating in its Vessels, without being tainted.

It may be objected from what I have said (§ 25.) of the Branches of the umbilical Vein absorbing the *Liquor Amnii*, that supposing this Liquor to have been corrupted in the manner I have explained it, the *Fætus* could not have remained sound, because the absorbent Veins must have taken up this corrupted Stuff, to mix it with the Blood of the *Fætus*. To this I answer,

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the Quantity taken up by Absorption, is but small, and the Time would appear to have been but short, in which it could here have been absorbed. Next, I would observe, That though a gentle Contraction is necessary for increasing Absorption, yet very acrid Substances irritate absorbent Vessels to such a strong Contraction, as makes them incapable of performing their Functions, which I take to be one principal Reason why Poisons when swallowed, do so much less Harm, than when they are immediately mixed with the Blood; and hence the very acrid Kinds of them are observed to produce all their bad Effects on the *primæ viæ*, without any Appearance of their having entered the Blood-vessels (a): So that we have Reason to think the Child to have been in much less Danger of suffering, by what the Absorbents of the *Amnios* could take up in such a Case, than if the putrid Liquor had been swallowed for Food, when it would surely have hurt the alimentary Tube; and if it had gone further, it must have tainted the whole Mass of Blood; or if the Lacteals had refused it Entrance, the Child would have been famished; and at any Rate it would have laboured

(a) Wepfer. de Cicut. aquat. Meid on Poisons.

houred under some Disease, whereas in the History it is affirmed to have been found and healthy.

WHETHER then we consider the Liquor of the *Amnios* in a sound or morbid State, *it appears to be very ill calculated for serving as Food to be taken into the Stomach of a Foetus.*

P R O B L E M III.

Whether the Liquor Amnii passes into the Stomach of a Foetus.

THE Impossibility of having ocular Demonstration of the Fact inquired after in this *third Problem*, has occasioned a great many Circumstances to be used by way of Arguments, each of which we must examine; and if they all point one Way, and the Conclusions arising from them are favoured by the Solutions of the two preceding Problems, the general Conclusion concerning the Nutrition of the *Fœtus* will be sufficiently warranted.

THE first Thing I offer against the *Liquor Amnii* passing into the Stomach of a *Fœtus* is, the Improbability of a Liquor that is to serve for Food being previously sent into the *Fœtus's* own Vessels, there

to circulate and to be fecerned in order to prepare it for being fwallowed, which § 24. and 26. fhew would be the Cafe on this Suppofition.

No Matter where this Liquor is feparated, or from what Source it comes, will the Advocates of the other Side fay, if its Passage into the Stomach can be proved; which they infer does happen from,

1. THE Refemblance which they alledge is to be feen between the Liquor of the *Amnios*, and that of the Stomach.

I have already defcribed the Liquor of the Stomach, as I have feen it in *Fætufes* of different Animals, (*See* § 30.) but have not had Opportunities to obferve the Liquor of the *Amnios* in the different States of a fufficient Variety of *Fætufes*; and therefore fhall firft confider it, as it is represented by the Gentlemen who differ in Opinion from me, and afterwards fhall fuppose what I faw in Cows to be general.

If the Liquor of the *Amnios* is at firft mild and mucaginous, and afterwards becomes thinner and more acrid, it differs greatly from the Liquor of the Stomach, which on the contrary turns gradually more viscus as the *Fætus* increases. (§ 30.) Nor will it fuffice to fay, that the finer Parts are abforbed by the Veffels of the
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Stomach, for by such an Absorption it could never happen, that a thin watery Liquor would leave a greater Quantity of a gross *Mucus* than a thick Gelly would do ; especially when there is less Time allowed for the Absorption of the watery Liquor, by the quicker Digestion which the *Fætus* must be supposed to have when it becomes larger and stronger. Upon which Account too, the Contents of the Stomach would be more and much oftner diluted by the thin Food swallowed in greater Quantities and more frequently. And then, we might expect sometimes to see the thin Liquor lately taken down, and the thick Remains of the former Food distinct, without being blended, as we observe the *Mucus* of the Stomach of Adults to keep in a separate Body from any thin Liquors drunk some little Time before they are vomited : This however is never observed in the *Fætus*, though it has neither Respiration, Vomiting, nor other conquassatory Pressure on its Stomach to incorporate the different Liquors contained there ; and therefore there is no Probability that they should be so intimately blended. So that on the whole, the Liquors of the *Amnios* and Stomach are so far from resembling each other in this Case, that their Appearances disco-

ver them to be very different, and destroy the Supposition of that of the *Amnios* ever being sent down into the Stomach.

Let us next see how well the *Liquor Amnii* of Cows taken for a general Rule will serve to support this alledged Resemblance. It must indeed be owned, that till the Liquor of the *Amnios* comes to a certain Degree of Viscidity, which, as near as I could guess, happens when the Cow has gone three fourths of her Time, the Appearances of Resemblance are pretty favourable, only while the *Fætus* is very young, the Objections to the former Supposition take Place, because for some time this Liquor is glairy, then becomes more watery, and afterwards thickens, till it comes to much the same Consistence with that in the Stomach at the Period just now mentioned, after which the Appearances are quite destructive of any Resemblance; for the *Liquor Amnii* becomes considerably thicker: And even during that favourable Period, when their Consistence is so like, I have often seen the *Liquor Amnii* dark-brown coloured and turbid, while the Liquor in the Stomach was of a very pale, watery Colour, and pellucid; and at other times I have observed the contrary of this, and other remarkable Varieties

ties of Appearances : Which perswades me that there is no Communication between the Cavity of the *Amnios* and the Stomach.

You certainly have remarked, that I have made no Comparison of the Taste, Smell, or Coagulation of these two Liquors, which is omitted designedly, because neither Smell nor Taste are very greatly different in any of the saltish watery Liquors of the Body, for that in the *Pericardium*, *Thorax*, *Abdomen*, *Joints*, the *Saliva*, &c. of a *Fætus* smell and taste as like to either of the Liquors that are the immediate Subject of our Inquiry, as these two do to each other; and different Salts, Heat, &c. produce much the same Effect upon all of them.

2. THE Liquor of the *Amnios* is said to be generally consumed, or in very little Quantity, at or near the Birth; from which it is inferred, that it has been swallowed down by the *Fætus*. *De Graaf*, in Confirmation of this Fact, tells us (*a*), that he dissected a Rabbit when she was about to kittle : In the Time of his dissecting the Mother, some of the *Fætuses* came out with their Membranes intire, and without any Liquor contained in the *Amnios* or *Chorion*. He observed also the same thing in

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(a) De Mulier. Organ. cap. 15.

the others that were taken out of the *Uterus* ; and to be assured that the Coats were not broken, he distended the Membranes with Air, and found they were intire.

Whatever Truth is in the general Proposition, I think *De Graaf's* Observation, which he fancies equal to a Proof of it, is good for little, because it shows only what happened in that particular Animal, without determining what the Quantity of the Liquor is for ordinary in Rabbits ; far less does it teach us what we ought to say of Animals in general.

I am certain that a great many Creatures have not all this Liquor consumed at Birth, having had my Arm wet up to the Shoulder when the Waters broke, while my Hand was in the *Vagina*, in some Cases where Necessity has obliged me to act the *Accoucheur* to Women ; and we see every Day how the Cloaths are wet when the Waters come away. I have also seen a remarkable Quantity of Liquors still remaining in the *Amnios* after the Delivery of several Animals, but my Observations have not been sufficient to determine (except in one Species of Animals, *Cows*,) what Proportion the Liquor of the *Amnios* bears at Birth to what it was formerly ; and I know no Author, except *Harvey*, who seems to
write

write on this Subject accurately, and from Observation. When he is endeavouring to prove the *Liquor Amnii* to serve for Food to the *Fætus*, he raises this Objection to himself (a); “ One might believe, that
“ the Liquors which we appointed for Food
“ to the *Fætus* are excrementitious, and
“ chiefly on this Account, because they
“ increase as the *Fætus* turns bigger; and
“ in the Birth of several Creatures, when
“ it is probable all the Aliment is consumed, they are seen in great Plenty.” And where he is treating of the humane Waters, and is proving the *Liquor Amnii* to be no Excrement, he says (b), “ It is
“ seen in less Quantity proportionally
“ (*pro proportione*) near the Time of
“ Birth.” Allow me to add what Observations frequently repeated have taught me, that in *Cows* this Liquor is evidently decreasing in its Quantity some Months before the Delivery.

You surely see what a Loss I must be at to lay down any general Rule concerning the proportional Quantity of the *Liquor Amnii* in the different Times of Gravitation of different Animals. What the Gentlemen who differ in Opinion from me will undoubt-

(a) De Humor. Uter. (b) Exercit. 56.

undoubtedly be best pleased with, is to take my own Observations on *Cows* as the general Rule; which I am satisfied rather to do, than be exposed to perpetual Wrangling about this Fact. Let us suppose then, that the Liquor of the *Amnios* increases in its Quantity for some more than the first Half of the Time of Gestation, and after that decreases, till at the Birth it is in very small Quantity. The Consequence they draw is, That the Consumption of the Liquor is made by its passing into the Stomach of the *Fætus*. But, with Submission, they cannot come so soon at their Conclusion: They must previously prove one or other of these two Propositions, either that the Liquor does go down into the Stomach, or, that it cannot possibly be carried off any other Way. The Truth or Falseness of the first of these depends on the Arguments examined in the subsequent Part of this Essay, and must share the same Fate with them; and as to the latter Proposition, I flatter my self that I have demonstrated another Passage by which it may go, (§ 25.) and really by which only we can suppose it to go, in order to account for all the *Phænomena*, which I would do thus. While the *Fætus* is weak, the Arteries of the *Amnios* pour out more than the Veins take

take up, (§ 15. and 26.) and the Heat, assisted by the conquassatory Motions, to which the Liquor is exposed, melts down its Particles, and makes it appear more watery: But when the Vessels of the *Fœtus* become stronger, and consequently the Veins absorb more (§ 15.), the Quantity collected does not increase so fast, and in some Time the Liquors thrown out, and those absorbed are pretty near equal, when the Quantity of the *Liquor Amnii* remains much the same; till at last the Veins prevailing, the Quantity diminishes, and continues to do so till Birth; but seeing the Veins take up chiefly the finer Particles; what they leave must become more thick and viscous. All this will *cæteris paribus* be observed in different Animals proportionally to the Sizes and Numbers of the Vessels. If what *Rouhault* (a) affirms be true, of the humane *Liquor Amnii* being always in a watery State, which so far as I could observe, it is rather more than in other Creatures; the Arteries or exhalant Vessels are smaller, and the Veins perform less Absorption than those of Brutes do.

This *Liquor Amnii* serves to keep the *Fœtus* and its Membranes soft and extensible,

(a) Mem. de l'Acad. des Sciences, 1714.

sible, hinders them to cohere, and defends the *Fætus* from Pressure or other Violence, which it needs most to be protected from, while its Parts are very tender, for which this Liquor is then, at least, in greater Proportion than afterwards, when the *Fætus* is firmer and stronger; and by the Liquors real or proportional Quantity being less towards the Time of Birth, the Mother is not in so much Danger of suffering by the over-stretching of her *Uterus*, as she certainly would be, if the Waters increased proportionally with the *Fætus*.

What I have said of the Changes produced on the *Liquor Amnii*, will perhaps be better understood, by naming some analogous Cases; such are, the viscid Nature which the Water in a Dropsy of old standing acquires; the Progress of incysted Tumors from a *Hydatis* to a *Steatom*; the Course of a large *Oedema* at the End of an acute Disease, to its changing into what the Surgeons call a *white Swelling*, and at last to its Cure. None that I know ever affirmed the Liquors reassumed into the Mass of Blood in any of these Cases; nor what is constantly absorbed in a natural State, from the *Pericardium*, *Thorax*, *Abdomen*, &c, to serve as Nourishment; and therefore I cannot expect that what is just now
said

said of the *Liquor amnii*, will weaken what I said formerly of the Improbability of a Creature's furnishing its own Food.

3. BESIDES these Arguments deduced from the Quality and Quantity of the *Liquor Amnii*, it is further pleaded by those who favour the Opinion of the Nutrition of a *Fætus* by the Mouth, That the *Fætus* shows it was in use to take down Aliment while it was in the Womb, by its knowing how to suck as soon as it is born.

This is building on that *divinæ particula auræ*, that Principle which is commonly called *Instinct*, and of which we observe daily Examples in propagating the Species, and preserving the Individuals among Animals, but of which we have no Comprehension. Can any one assign a physical Cause, why of Ducklins and Chickens hatched under the same Hen, the former should, contrary to the Example and anxious Warnings of the Parent, run into each Pool they can come at, while the others shun going into Water? Who taught a young Stallion that has been always kept out of Sight of Mares, either the Instruments or Manner of Generation? And in the present Case, what is there in the least analogous to a Nipple within the *Amnios*, on which the *Fætus* could have practised suck-

sucking while in the Womb? These are Subjects we may admire, but lose our selves when ever we pretend to account for them.

4. HERE is, say they again, a Liquor in the *Amnios* constantly applied to the Orifice of a Canal that leads to a Cavity, and therefore it probably will pass down there.

To this it is answered, That there are Impediments both to the Entry and Passage of the Liquor. The first is, the Lips being generally found shut in a *Fætus*: This however is denied by the other Side to be true in Fact. In my Opinion it is of no great Consequence in the Argument, whether the Lips of a *Fætus* are found to be contiguous or not, unless some other Circumstances can be determined at the same Time. If the Lips, for example, are found shut, it is necessary to know whether the *Fætus*, while in Life, had not or did not exercise the Power of opening them. And if, on the other Hand, the Mouth is seen open, we ought to enquire whether that is not owing to the shriveling Contraction or handling of the Parts after Death. In most of the *Fætuses* of Cows which I looked at, the Lips were contiguous; in some few, I have seen the Point of the Tongue lying between them; and in all

all the humane *Fætuses*, which I have had the Opportunity of seeing, the Lips were contiguous. One might indeed judge that the Mouth generally would be shut in a living *Fætus*, from what was said (§ 29.) of the Muscles of a *Fætus* being left to their natural Action; and from what we see in most Animals when they are asleep. The Force by which the Lips are kept contiguous, will however not probably be so great, as that by which the Eye-lids are shut, because the *Sphincter oris* does not seem to be so much superior to its Antagonists, as the *orbicularis palpebrarum* is to the *rectus Fallopii*.

This Obstacle of the Lips is not the only one; for the Under-jaw being supported by its *Levators*, will keep the Tongue applied to the Roof of the Mouth; and the *Pharynx* always is shut in Animals, unless when the voluntary convulsive Action of Deglutition is performed. That I might know how these Parts appeared in a *Fætus*, I opened the Mouths of several, then cautiously depressing the Point of the Tongue, I saw the Root of it raised up against the Palate. When the Root was also depressed, I observed the *velum pendulum* was hollow below, where the Tongue had been lodged, and was so convex above, as to
shut

shut up the Passages to the Nostrials. As to the *Pharynx* being always shut, it is universally known; but to make sure of it, I put a Funnel into the Mouths of several *Fætuses*, after their Tongues were depressed, and holding them erect, I poured Water into the Funnel, but none passed farther than the Root of the Tongue.

I cannot omit the Mention of the remarkable Mechanism employed here, for keeping the Tongue more closely applied to the Palate, chusing the humane *Fætus*, as best known, to illustrate it by. You know that the Force exerted by Muscles in their natural Contraction is increased and diminished proportionally to their being more or less stretched. You also know, that the Muscles coming from the Jaw to the Tongue and *Os Hyoides* are thicker, consequently stronger, than those that come to these Parts from the *Sternum* and *Scapulae*. Now, when a *Fætus* lies with its Neck bended, such of these Muscles as are situated below the *Os Hyoides* are considerably relaxed, which those above it are not. Since therefore these latter are naturally stronger, and gain so much over the others by the Difference of their stretching, it is no Wonder that they pull the *Os Hyoides*, Tongue, &c. strongly upwards, and
press

press them so strongly against the upper Part of the *Fauces* and Mouth, as to leave their Print in the flexible Parts, and by bringing all the Sides of the Passage into the *Oesophagus* close together, prevent any thing's getting down into it.

Since then there are such Obstacles to be overcome, the *Liquor Amnii* cannot pass, unless either the Force with which it is squeezed is superior to the Resistance, or the *Fætus* must perform the Action of Deglutition.

I SHALL not stop here to consider the bad Consequences which such Pressure on the very tender Parts would have while the Chasm of the Mouth is not shut (§ 28.) to make Resistance ; but shall proceed directly to examine what is called by several Writers an Experiment which demonstrates the Passage of the Liquor of the *Amnios* into the Stomach : It is related thus by Mr. *Heister* (a), “ I received a full-formed perfect *Fætus* of a Cow, inclosed in the *Uterus* and Membranes, in cold Winter Weather ; where not only the Liquor of the *Amnios* which surrounds the *Fætus* was frozen, but the same Liquor was found frozen in the Mouth,

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“ *Oeso-*

(a) Compend. Anat. not. 37.

“ *Oesophagus* and Stomach, like one continued Substance: The Column of Ice in the *Oesophagus* was about an Inch thick. I happened to see the same another Winter.”

If any Use is to be made of this Experiment, in proving the *Liquor Amnii* to be sent into the Stomach, it must be said, that the freezing of the Liquors did no more than show more distinctly how the Waters were lodged before they were turned into Ice; and if this is true, then we would see all the Contents of the Stomach run out, whenever a *Fœtus* is suspended with its Head lowest; or if the Mouth and *Oesophagus* are slit open, while the *Fœtus* is hanged by its Mouth after being taken out of the *Liquor Amnii*, we would observe Part of the Column of Water to run out at every Cut, and all the Canal would be seen full below where it is opened. These Things would certainly, I say, be seen, if the Experiment did no more than consolidate the Water naturally lodged in the *Oesophagus*. But after many repeated Trials I can assure you, that none of these Things do happen; and therefore it is more reasonable to believe, that the icy Column which Mr. *Heister* saw in the *Oesophagus*, was introduced there from the *Amnios* or
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Stomach by the immense expanding Force of freezing Liquors confined within the frozen rigid *Uterus* and *Secundines*, which every body knows is far superior to any Resistance can be supposed here.

To make my self still more certain about the Nature of this Experiment, I repeated the Trial already mentioned, of pouring Water into the Mouth through a Funnel ; and that it might not be thought to be hindered by the Liquors already contained there, I emptied the Stomach before I began to pour the Water ; but still the same Success of nothing passing down attended it. To confirm all more, I pushed a *Trocar* into the *Amnios* of several Calves involved in the *Uterus* and *Secundines*, and forcibly injected Milk through the *Cannula* of the *Trocar* ; then I caused the *Uterus* to be pressed strongly by several People, sometimes equally, other whiles alternately ; but though the Milk was thus intimately blended with the *Liquor Amnii*, none of it would pass into the Stomach ; which to me is a Demonstration, that Mr. *Heister*'s Experiment ought not to be mentioned as a Proof of what naturally happens to a *Fætus*, but only as a Trial of the Force of Expansion in freezing Liquors.

THE only other Supposition to be made

of the *Fætus* taking the *Liquor Amnii* into its Stomach is, that it swallows down these Waters, by performing the voluntary convulsive Action of Deglutition.

The Gentlemen who take upon them to assert, that the *Fætus* does perform Deglutition, being bound to bring some direct positive Proof of it, I shall forbear the Mention of probable Negatives, till I see how they maintain their Affirmation. At present I know nothing they can support it by, unless they say, that because it has the Organs, and a Capacity of exercising them, therefore it does perform this Action, as well as it employs some other Muscles in its *Stirrings*. But this way of Reasoning can never serve their Purpose, because there are many other Actions which a *Fætus* has the Organs and Capacity to perform, and yet evidently does them not; so before they can make Use of the foregoing Argument, they must show some Necessity the *Fætus* is under to perform this particular Action, or some manifest Advantage it is to gain by it. This will bring them to have Recourse probably to the Advantage of taking in Food; but by what was said in the Solution of the second Problem, and elsewhere in this Paper, I hope it appears, that instead of an Advantage, this would rather be

be hurtful to them : And therefore, if the Will did contribute to the Actions of these Organs of Deglutition in a *Fætus*, it would be directed by Instinct to keep the Passage into the Stomach close shut, instead of forcing down the *Liquor Amnii* into it.

5. LEST the direct Proof of the *Liquor Amnii* being pressed or swallowed down should fail, there are some other Arguments advanced that are thought to imply a Necessity of such a Liquor having been taken down ; among the rest it is argued, That it is necessary to keep the chylopoietick Organs of sufficient Dimensions, for receiving the due Supplies of Food after Birth.

If it had been considered how very languid and slow the Motion of the Contents of these Organs must be in a *Fætus*, where the contractile Tone of its own Fibres are so very weak, and where there is no exterior alternate Pressure by Respiration, or any other Power, it might have been thought that the Liquors supplied by the Vessels of these hollow *Viscera* would be sufficient for this Purpose, without the Addition of any thing from without ; and what we observe of the youngest *Fætuses* we can dissect, having their Stomachs full, (§ 30.) seems plainly to point out the Source of the Liquors there to be

no other than that Bowel it self. It would appear to me, that the Contrivance of pushing the Blood in the descending *Aorta*, with the united Force of both *Ventricles* of the Heart (§ 20.) is in part designed to promote a greater Secretion in these hollow *Viscera*, where the Resistance to the Effusion of the Liquors will be less than in ordinary Glands.

6. THE Quantity of *Mucus* in the Stomach and small Guts, and of the *Meconium* in the great Guts (§ 30, 31.), is looked upon by several Writers as a very convincing Argument for the *Fætus*'s feeding on the Liquor of the *Amnios*; and as a Proof *à posteriori*, they mention *De Graaf*'s (a) Example of a Whelp brought forth without a Head, whose Stomach was empty, and in whose Intestines there was found but a small (*modica*) Quantity of Excrements. 'Tis also probable, that a Circumstance in the second Child, which Mr. *Calder* describes (b), may be made use of here, *viz.* That having the Passage from the Stomach into its Guts shut up, there was but a small Quantity of *Meconium* in its great Guts. For it may be said, that *De Graaf*'s Whelp shows the Stomach not to furnish its own

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(a) De Mulier. Organ. cap. 15. (b) Medical Essays, Vol 1. Art. 14.

Liquor, but to receive it from the Mouth; and as well as Mr. *Calder's* Child, had little *Meconium*, because the *Liquor Amnii* was not sent down into the Guts.

I am so far from thinking that the Quantity of Matter ordinarily contained in the Stomach and Guts of a *Fætus*, is any Argument for Food being furnished from the *Amnios*, that on the contrary it appears to me very strong against that Opinion; for it is scarce to be imagined that the *Meconium* should be the Recrement of any Proportion worth notice of the Food it had during the whole nine Months of Gravitation, seeing there is scarce more of it than what an Infant passes of *fæces* in one Day; and that its Colour evidently discovers the Liquors secreted within the *Fætus's* Body, to compose such a considerable Share of it.

If *De Graaf's* Whelp is applied to the Use I have made of it, namely, to prove the Stomach incapable of furnishing any Liquor, because this one was found empty, it will certainly be allowed by every one to prove too much, since none can with any sort of Reason say that the Stomach secerns no Liquor. But lest I should be said to extend this Example designedly to too general a Conclusion, in order to elude the natural Consequence, I shall give my Opinion of

the Fact as it is related. It is this, That I would blame a faulty Disposition in the Vessels of that Whelp's Stomach for its Emptyness, because I shall soon give positive Proof of the Stomach's being capable of furnishing the Quantity of Liquor commonly found there in *Fætuses*, without receiving any thing from the *Amnios*.

It needs be no Surprise that there were few Excrements in Mr. *Calder's* Child, since the two great Sources of them were wholly or in part stopped. The Stomach sent nothing down, and the divided *Duodenum* hindered the biliary and pancreatick Liquors to pass freely.

But to overballance these two Examples, and indeed the general Argument also, by positive Proof of the Stomach and Guts being able to furnish their Contents, which must be of more Weight than any Negatives can, I shall likewise mention two Histories; the first is, of the Pig, which Dr. *Bellinger* (a) describes, brought forth with its Mouth quite shut up, but having its Stomach and Guts full of the usual Contents. The other Instance is rather stronger; for Mr. *Antoine* (b) found a glairy yellow Liquor like to Excrements in the Stomach

(a) De Fœt. Nutr. chap. 9. (b) Hist. de l'Acad. des Sciences, 1703.

mach and Guts of a Lamb, that had neither Head, Heart, Lungs, Liver nor Pancreas, which I hope will be convincing, that the *Meconium* is no other than the grosser Parts of the Liquors secreted in the alimentary Tube, and of the Bile and *pancreatic* Juice.

These are all the Arguments of any Weight that I know to be advanced for proving the Passage of the *Liquor Amnii* into the Stomach. In answer to which I have offered Reasons, which seem to me to turn them all in favour of the Side of the Question opposite to that for which they were advanced; and therefore I must conclude this third *Problem*, by asserting, *That the Liquor Amnii does not pass into the Stomach of a Foetus.*

The CONCLUSION.

SEEING then all the three *Problems* are resolved with respect to viviparous Animals, so as to favour the Nutrition by the Navel alone, allow me to sum up all by a short Recapitulation of the Arguments which I have insisted on at so much length.

The *Fœtus* being capable of receiving its whole Nourishment by the umbilical Vein alone, whereas none can subsist without the umbilical Vessels. ——— The Li-
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quor of the *Amnios* being ill calculated in its natural State for the Food of a *Fætus*; and becoming sometimes altogether unfit Food in morbid Cases, without the *Fætus* being any way injured.—— It being highly improbable that a Creature should furnish its Food out of its own Body, which must be the Case, if the *Fætus* feeds on the *Liquor Amnii*.—— Seeing it cannot be inferred from any Resemblance of the Liquors of the Stomach and *Amnios*, nor from any other Appearances, that that of the *Amnios* ever is sent down into the Stomach.—— Seeing no direct Proof can be had of the *Liquor Amnii* being pressed or swallowed down, but on the contrary, all Circumstances make it probable that it does not go down.—— And since all the Phenomena of a *Fætus* can most reasonably be accounted for, without supposing the Liquor of the *Amnios* to be any Part of its Food. Is it not reasonable after all this to exclude the Mouth from the Office of conveying the Aliment of the *Fætuses* of viviparous Animals, and to believe that all their Nourishment is conveyed by the umbilical Vessels.



X. *The Sequel of the preceeding Essay on the Nutrition of Foetuses, by the same.*

I Come now to consider *How far the Nutrition of the Foetuses of oviparous Animals, and of Plants, serves to illustrate or confirm what has been argued for in the preceeding Essay*; the Plan of which I shall here follow; but beg to be excused, if instead of mentioning only the Facts immediately necessary, I take the Liberty to give a short History of an Egg, and of the Changes brought on it by Incubation, with an Abstract of the Formation and Vegetation of the Seeds of Plants. My Reasons for taking in more Facts than are just necessary, are, That several of these cannot be rightly understood, without a previous Knowledge of others; and in the next Place, I have observed that such a History of Eggs and Plants as I propose to give here, is very little known, notwithstanding accurate Treatises have been wrote on these Subjects, which I think may be attributed to their being treated of in a Manner that requires more Study than most People are willing to employ in picking out

out from among the numerous particular Examples these Authors describe, the Facts necessary for composing an orderly general System, which is what I aim at here.

Of the Nutrition of the Foetuses of Oviparous Animals.

TO save the perpetual Repetition of my being assured of the Truth of each Fact by repeated Observations, I shall advertise you once for all, that unless where I expressly confess I had no Opportunity, or neglected to examine them, you'll be pleased to believe, that I am obliged to give ocular Demonstration of what I assert.

1. THE Shell of an Egg becomes more brittle by being exposed to a dry Heat.

2. THE Shell is lined every where with a very thin, but pretty tough Membrane, which dividing at or very near to the obtuse End of the Egg, forms a small Bag where only Air is contained.

3. IN a new laid Egg this *Folliculus* appears very little, but becomes larger when the Egg is kept.

4. THE *Albumen* or *White* of an Egg is contained in concentrical Membranes, but is not all of the same Consistence; for the exterior Part of it is thin, and diffuses itself almost

almost like Water, when the Membranes are broke; whereas its interior Part is more viscous.

5. THE *White* of an Egg can make its Way through the Shell, as appears from its wasting by keeping, especially if it is exposed to gentle Heat.

6. THE globular *Vitellus* or Yolk would seem to be no other than a Liquor inclosed in a Membrane, because whenever the Membrane is broke it runs all out; and it is specifically heavier than the *White*.

7. THE *Chalazæ* are two white spongy Bodies, rising very small from opposite Sides of the Membrane of the Yolk, but gradually become larger as they are stretched out from it in an oblique Direction with regard to the two Ends of the Egg.

8. IF we compare the *Chalazæ* to the Extremities of an Axis passing through the spherical *Vitellus*, this Sphere will be composed of two unequal Portions, its Axis not passing through its Center; consequently, since it is heavier than the *White*, (§ 6.) its smaller Portion must always be uppermost in all Positions of the Egg.

9. THE yellowish-white round Spot called *Cicatricula*, is placed on the Middle of the smaller Portion of the Yolk; and therefore,

fore, by § 8. must always appear on the superior Part of the *Vitellus*.

10. THE *Cicatricula* seems to be composed of several Circles of different Colours, and in a fecundated Egg contains the Embryo or Chick, see *Malpigh*. (a).

11. Eggs whose obtuse Ends are all rubbed over with Linseed Oil, or such other Substances as block up small Pores, are as fit for bringing forth Chickens, when incubated by a Hen, as other Eggs are.

I did not make the Experiment, but can give a Voucher, whose scrupulous Candour, with sincere good Wishes and Endeavours for the Improvement of Physick in this Place, some of you must be acquainted with, I mean my Father, who besmeared eighteen Eggs in the Manner mentioned; then having put a Mark on them, he set them with the like Number of other Eggs, under three Hens, who brought out thirty six Chickens, not one Egg of the whole Number failing.

12. AFTER *INCUBATION*, the *Folliculus Aeris* is gradually extended; till, near the Time of the Exclusion of the Chick, it occupies, as near as I could judge,

(a) De Ovo incubat.

judge, some more than a third of the Cavity of the Shell.

13. THE extended *Folliculus* does not collapse, upon being exposed to the Pressure of the Atmosphere, after incubated Eggs are opened (a).

14. BY Incubation the *Albumen* becomes thinner and more turbid, especially on its upper Part near to the Air-bag, where it is also first consumed; and it is afterwards diminished toward the sharp End of the Egg, till at last nothing of it is left except a white cretaceous Substance at the lower Part of the Shell.

15. AS the Part of the *White* nearest to the *Cicatricula* is wasted, its Membrane and the *Cicatricula* still approach nearer, till they become contiguous. This Membrane of the *Albumen* is what is commonly called the *Chorion*.

16. SOMETIME before the *Albumen* is quite consumed, what remains of it is placed

(a) It is somewhat out of my Sphere, to inquire how this additional Air gets into the *Folliculus*; but if any are curious enough to make this Inquiry, I would recommend to them, to observe how this *Folliculus* distends and keeps stretched in an exhausted Receiver of an Air-pump; to exhaust the Air gradually out of the Shell, while it stands exposed to the Atmosphere, both while the *Folliculus* is intire, and after it is broke, observing always the rising or falling of the Mercurial Gage. To consider § 11. and 13. and to consult Bellini, *De Mot. Cord. Prop. ix.* and Hales's *Statics*.

placed at the lower Part of the Egg, and therefore the Yolk is interposed betwixt it and the Membrane, which immediately contains the *Fætus*, (*vid. §. 9. and 10.*).

17. THE *White* of a fecundated Egg, is as sweet, and free from Corruption, during all the Time of Incubation, as it is in a new laid Egg.

I tasted, smelled, and swallowed the *Whites* of Eggs during all the States of Incubation, both when they were raw and boiled, and constantly found it as just now described; and therefore can't imagine how *Bellini* (*a*) could affirm it to have a heavy, abominably ungrateful Taste, a stinking Smell, and not only to occasion, when swallowed, a troublesome Sensation in the Stomach and Guts, but to prove purgative. He must unluckily have examined none but subventaneous Eggs; which is further confirmed by his Description of the small Particles in the colliquated *Albumen*, that reflect Light so strongly as the Eye cannot bear it; which I saw in some subventaneous Eggs, but could not observe in any that were impregnated.

18. ACCORDING to *Bellini* (*b*) the colliquated *White* always becomes incapable of

(*a*) De Mot. Cord. Prop. vi. (*b*) Ibid.

of Coagulation by Heat; but in the Trials I made, it frequently did coagulate, tho' I found the Success of this Experiment very uncertain; the only general Rule I could fix was, that before the 9th or 10th Day of Incubation, the thinner *White* did not generally coagulate, but after that it frequently did.

19. VERY soon after Incubation, the Volume of the Yolk appears increased, and by its rising then nearer to the upper Part of the Egg, one may conclude that its specifick Weight decreases.

20. THE Yolk becomes pale and more fluid for some Time, especially on the Side next to the Chick, where its Bulk also soonest increases; but afterwards the Membranes of the Yolk turn firmer and stronger, and the Liquor in them is less in Quantity and becomes more viscous.

21. As the Chick increases, the Yolk is depressed in the Middle, and is soon brought into a Form something like to a Horse-shoe, in the Middle of which the Chick is lodged.

22. THE Yolk remains fresh and uncorrupted all the Time of Incubation, and is always coagulable.

23. NOT long before the Exclusion of
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the Chick, the whole Yolk is taken into its *Abdomen*.

24. THE whole *Albumen* and *Vitellus* are not consumed by the Chick, for some Part of the Humors of the Egg escapes thro' the Shell, and is not supplied by any thing from without; as evidently appears by an Egg's becoming so much specifically lighter, as to swim in Water after Incubation, though it sunk in it when recent.

25. THE *Chalazæ* remain long without being considerably changed, unless that they are brought nearer to each other by the crescent Form of the Yolk, at last they degenerate into a dry chalky Substance.

26. THE *Cicatricula* very soon is enlarged by Incubation; and being buoyed up on the Top of the Yolk, to the superior Part of the Egg, it is placed very near to the Air-bag; and when both increase, they become contiguous.

27. THE *Cicatricula* is called *Amnios*, when it becomes large, and contains the *Colliquamentum* or Liquor in which the Chick is immersed.

28. THE Quantity of the *Colliquamentum* gradually increases till the 15th or 16th Day of Incubation; on the 18th it is all consumed; and in the three following Days
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scarce any Moisture can be observed on the internal Surface of the *Amnios*.

29. THE Liquor of the *Amnios* is more clear and transparent than the colliquated *White*; its Taste is more salt, and it has no observable Smell. Its Consistence is at first a little viscous, then it becomes more fluid, and afterwards turns a little ropy again.

N. I can say nothing of the particular Times when it does or does not coagulate by Heat; for it is in so small Quantity during the greater Part of the time of Incubation, that one can scarce gather as much in a Spoon, as is fit to make any Experiment with; and when all the Egg is boiled hard it adheres so closely to the *White*, that it is scarce possible to distinguish one from the other. *Malpighius* (a) speaking of the Egg between the 14th and 19th Day, says, "That this thin diaphanous Liquor of the *Amnios*, was sometimes forced by boiling into a white tasty Substance," which my Trials also confirmed.

30. THE *Allantois* and its contained Urine, are to be seen in an Egg, as well as in the *Secundines* of viviparous Animals.

31. THO' the Heart is among the first

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Parts

(a) De Ovo incubato.

Parts of the Chick that can be distinguished, yet the umbilical Vessels are seen much about the same Time that the Heart is observed.

I did not enquire into this Fact, but have two very good Vouchers for its Truth, *Harvey* (a) and *Malpighius* (b).

32. THE umbilical Vessels gradually disperse their Branches upon the *Amnios*, upon the *Vitellus*, and upon the Membranes of the *Albumen*: The Extremities of their much greater Number, being immersed into the *White*, are extended proportionally as it is colliquated.

23. NEAR to the End of Incubation, the umbilical Vessels begin to shrivel and decrease, till at the Exclusion they are very small.

34. THE *Embryo* is seen in an Egg at first in Form of a small Worm, then its *Carina* or Spine with the large Prominencies that afterwards show themselves to be the Brains and Eyes appear; the other Bowels seem hanging from the Spine; the Chasm of the Mouth discovers it self; the Extremities sprout out; the *Viscera* are gradually covered with the Teguments; and at last the Beak, Nails, and Feathers are seen:

(a) De Generat. Animal. Exercit. 16. & 17. (b) De Ovo incubato.

seen: After which all the Parts become stronger and firmer, the proportional Bulk of the Head decreasing.

For the particular Times when all these Changes are thus orderly brought about, consult *Fabric. ab Aquapendente, Harvey* and *Malpighius*.

35. AFTER all the Parts of the Chick are formed, it is always found lying on its Side, with its Neck greatly bended forward, the Head being covered with the upper Wing, and the Beak placed between the Thighs.

36. WHEN the Shell is opened after the Chick is large and strong it may be seen to bounce and spurn, sometimes opening its Mouth wide, especially if it is stirred or pricked.

37. THE Mouth, *Oesophagus* and *Ingluvies* are always found moist, but never contain any Quantity of Liquor that can be collected, or will run out in Drops.

38. THE bulbous glandular Part of the *Oesophagus* immediately above the Stomach, or what *Peyer* (a) calls the *Infundibulum*, and the Stomach, are full of a Liquor in the youngest Chick we can dissect, and continue full the whole Time of Incubation; neither *Infundibulum* nor Stomach

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having

(a) Comment. in Anat. Ventricul. Gallin.

having yet got the tendinous Firmness they have in Adults; nor can we observe the dry pellicle which is so easily separated from these Parts in Hens.

39. THIS Liquor of the Stomach is at first thin and more watery; afterwards it becomes curdy, and at last is all in Form of a greyish white *Mucus*, unless that some Part of it frequently is coloured yellow or green, by a Mixture of Bile. It always coagulates by boiling, into a firm yellowish white Substance.

40. THE Quantity of *Fæces* was not large in the great Guts of any Chickens I opened before Exclusion.

41. A little Time before the Exclusion, the Chick may frequently be heard making the same pieping Sound that hatched Chickens make. In three Eggs, which were all I opened in this State, the Beak of the Chick had perforated the Membrane of the *folliculus aeris*.

42. THE Shell at the obtuse End of the Egg frequently appears cracked sometime before the Exclusion of the Chick.

43. THE Chick is sometimes observed to perforate the Shell with its Beak, but in those I saw tumbling out of the Shell, it was broke off irregularly, at the Place
where

where the Membrane of the *Folliculus a-*
eris was joined to it.

44. AFTER Exclusion the Yolk is gradually wasted, being conveyed into the small Guts by a small Duct; its Membranes gradually contract themselves, and the Duct becomes shorter. On the tenth Day after Exclusion, the *Vitellus* was no larger than a small Pin-head, and the Duct was scarce one twentieth Part of an Inch long.

From this History of the Egg and of Incubation, I shall endeavour to deduce the Manner in which the colliquated White is taken in by the Chick.

Authors generally seem to agree, that the oviparous *Fœtus*, while very young, receives its Nourishment by the Navel; but several of the best Reputation have been of Opinion, that afterwards it is conveyed by the Mouth. I shall examine the Arguments they used in Proof of this; and then shall subjoin some negative Reasons which they have not taken notice of.

Bellini (a) has described the *Cicatricula* or *Sacculus Amnii* with the *Chalazæ* first formed in the Back of the Hen; to

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which,

(a) De Mot. Cord. Prop. ix.

which, according to him, the *Vitellus* is afterwards joined, and the *White* is acquired as they tumble down the *Oviduct*. He says the *Chalazæ* are composed of numerous Canals which open into the *Amnios*, and send out their Roots into the Cavity of the Yolk, and into the *White*. It is easy to conceive what Consequences may be drawn from this Description, by those who assert the Nourishment to be carried by the Mouth, *viz.* That here are direct Passages into the Cavity where the Chick is, which can take up the Liquors no other Way than by the Mouth.

The Answer to this Observation is the the same as has been made to the other Facts already quoted from this Author. I deny that the *Sacculus Amnii* is formed before the *Vitellus*; on the contrary, the *Vitellus* is evidently to be seen before the *Cicatricula* or *Chalazæ* can be discerned. Next, I deny the *Chalazæ* (if they are Canals) to have the least Communication with the *Amnios*, at any time, or in any State of the Egg, otherwise than as they are both adhering to the Membrane of the *Vitellus*, upon which, or within which, no particular Fibres, no Canals are stretched to the *Cicatricula*. Every one has it in his Power to examine these Facts. If then the
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Facts are denied, the Consequences cannot be admitted.

Harvey (a) affirms, that a Liquor is found in the Mouth and *Ingluvies* of the Chick, which he concludes to be the *Colliquamentum* or *Liquor Amnii* from their Resemblance, from the Quantity of the Contents of the Stomach, from the Chick's being seen to open its Mouth, and from the Necessity Creatures are in of swallowing, or of forcing back by vomiting, whatever is introduced to the Root of their Tongue.

As to the Resemblance, I do not see how the Comparison can be made, seeing the Liquor in the Mouth and Crop is in such small Quantity, § 37. But suppose that a sufficient Quantity was collected, the two Liquors agreeing in several Properties would not of itself be a sufficient Proof of their being the same; and if, for Argument's sake, the Liquor in the Crop was granted to be in very large Quantity, and to agree in every Property with that in the *Amnios*, it would certainly appear in the same Form for some Time in the Stomach, whereas it is always found very different there in the larger *Fætus*, § 39. and *Harvey* confesses as much in this Place; therefore it may be
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(a) De Generat. Animal. Exercit. 58.

concluded, that it does not get down into the Stomach.

The Quantity of the Contents of the Stomach and Intestines may be accounted for from § 38. applied to what was said on viviparous Animals.

Though Creatures that respire, are under a Necessity of either swallowing, or forcing back by vomiting, whatever is introduced beyond their *Fauces*, I cannot think it should be thence concluded, that a *Fœtus* is under the same Necessity ; for as it does not exercise Respiration, it will suffer no Inconvenience by a Liquor lodging near to the *Glottis*, whereas Creatures that breathe cannot allow any Substance to remain there without Danger of the *Glottis* being stopp'd, or of such Substances falling down the *Trachæa*, either of which would be of bad Consequence ; which the Creature prevents, by forcing such Substances out of such a dangerous Situation.

But to inforce the Negative of the *Colliquamentum* passing by the Mouth, observe, that there are only three Days in which this Passage can most probably be supposed to happen, which are from the fifteenth to the eighteenth Day of Incubation ; for, before the fifteenth, the Quantity of the *Liquor Amnii* is increasing, which
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is no great Sign of its being swallowed ; and after the eighteenth this Liquor is not to be seen, *vid.* § 28. If then the *Liquor Amnii* were all swallowed between the fifteenth and eighteenth Days, the Stomach ought to be fuller at this Time, and its Contents should be thinner, more pellucid, &c. like to the *Colliquamentum* ; which I assure you does not happen. Besides, if we suppose the Power of Digestion so strong as to expel this Liquor as fast as it is taken down in these three Days, it would certainly follow that this powerful Digestion, continuing in the three succeeding Days, while there is no Liquor to be swallowed, the Stomach ought to be quite emptied, which every one who opens the Stomachs of Chickens at this Time, will see it is not. And, *lastly*, As a more direct Proof still against *Harvey*, I broke the Shells of several incubated Eggs, while the *Colliquamentum* was in large Quantity ; and before the *Amnios* was opened I saw the Chickens open their Mouths very wide several Times, but could not observe the Quantity of the Liquor in which they lay any way lessened. I afterwards carefully dissected the Chickens, and found no other than the common small Quantity in the Crops, and the ordinary curdy *Mucus* in the Stomach, which

which seems to me a Demonstration that they do not swallow.

After such convincing Proofs, it will be needless to make any Application of the Arguments in the former Part of this Essay to this Subject; and therefore I shall only desire your Readers to compare the Posture of a Chick, and of a Hen while she swallows Liquors, that they may see the Posture of the Chick's Neck to be most unfavourable to the Supposition of Deglutition being performed; and then shall conclude with a very short History of Incubation, assigning what I imagine to be the most probable Reasons of the several Appearances.

By the Heat of the Hen, or of Stoves equal to it assisted possibly by the Action of the Air contained in the *Folliculus aeris*, (§ 2, 3. 12.) the *Albumen* becomes thinner, especially where it is most exposed to these Forces (§ 14.) and the *Vitellus* in the same manner becomes specifically lighter (§ 19.) and therefore readily rises in the White; and as, by being divided into two unequal Portions by its Axis the *Chalazæ*, it presents the smaller Portion to the incubating Heat at first (§ 8, 9.) so the Change in consequence of Incubation being soonest and most produced here (§ 20.) and the *Cicatricula*

trricula being enlarged at the same Time the smaller Portion of the Yolk becomes of the least specific Weight; and therefore is buoyed up to the superior Part of the Egg, whereby the *Folliculus aeris*, and Membranes of the *Cicatricula* become contiguous when they enlarge (§ 26.) and the *Vitellus* can never be in hazard of compressing the tender Embryo; and the umbilical Vessels are situated so as to have their Extremities immersed in the Liquors, that first undergo the proper Change, for being imbibed by their Orifices (§ 32.)—— The Incubation continuing, the *White* is still more and more colliquated, and the umbilical Vessels are proportionally extended, the Veins to absorb it, and the Arteries to throw out any Particles that are unfit for the Chick till they are farther prepared, but especially to drive forward the Liquors in the Veins, as was explained in the Account of the viviparous Animals, (§ 20.)—— When the *White* in the upper Part of the Egg is exhausted, its Membranes become contiguous to the *Amnios*, (§ 15.) and thereby the Membranes involving the *Fætus*, become sufficiently strong to resist the Motions of the Chick, when its Ease or Safety prompt it at any Time to spurn.—— The Powers of Incubation above
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mentioned, assisted by the Pulsation and conquassatory Motions of the numerous umbilical Vessels spread on the Yolk, (§ 32.) dissolve that Humour more, and render some Part of it fine enough to be taken up by the small Extremities of the umbilical Vein, some of which penetrate its Membrane; by which the Liquor at last becomes thicker (§ 20.) and the Membrane being in Part emptied, will more easily yield to the Weight of the Chick; and is pressed into the Form of a Horse-shoe (§ 21.) while the Net-work of Vessels extended on this Membrane render it stronger and firmer.—— The *Folliculus aeris* not only assists in colliquating the *Albumen*; but when the Humours of the Egg come to occupy a less Space, by escaping through the Shell (§ 24.) and by being changed into the solid Substance of the Chick, the *Folliculus* enlarging (§ 12.) keeps the Chick and Humours steady, without the Danger of being disordered and broke by the Motions of the Egg.—— Branches of the umbilical Vessels being distributed to the *Amnios* (§ 32.) the Arteries will pour out their Liquors into its Cavity in greater Quantity than the Veins can take them up, as long as the *Fœtus* is weak; but whenever the *Fœtus* becomes stronger,
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and consequently, the absorbent Power of the Veins increases (*vid.* § 15. of former Essay) they will take up the Fluid of the *Amnios* faster than the Arteries pour it in, and its Quantity will be diminished till it is quite exhausted (§ 28. and 29.) — This Absorption will go on more speedily in Proportion also to the umbilical Vessels being less distended with *Albumen*, whereby there is less Resistance to the progressive Motion of the absorbed Liquors; which probably is the Reason of the *Colliquamentum* being all taken up between the fifteenth and eighteenth Days. — By the constant Circulation and Renewal of all these Humors of the Egg, they keep fresh and uncorrupted in a fecundated Egg, (§ 17. and 22.) but corrupt soon in a subventaneous one, or in such whose *Fætus* dies in the Time of Incubation. — Where-ever Vessels are not sufficiently filled they contract themselves, and therefore, the *Albumen* being exhausted in the last Days of Incubation, the umbilical Vessels gradually shrivel, (§ 33.) which prevents the Danger of a Hæmorrhagy when the Chick is separated from its Membranes. But as the *White* is not sufficient at this Time fully to supply the Chick, the Yolk is taken into its Body (§ 23.), and being there pressed,

fed, it is thrown gradually by the proper Ducts (§ 23. and 44.) into the Guts, to supply that Defect. — The Vessels and Glands which open into the alimentary Tube separate at least as much Liquor as will moisten it ; and the Stomach having no callous strong Crust on its internal Surface (§ 38.), will separate more than it can do in the Adult ; and in the mean time the Glands of the *Infundibulum* pour out a Liquor that is always thicker as the Chick increases, till it becomes a very thick white *Mucus* : And therefore the Contents of the Stomach of the *Fœtus* in the Egg must have the Appearance described § 39. and will be slowly passing off into the Intestines. — The Shell at the obtuse End of the Egg becoming more brittle, by being so long exposed to a dry Heat (§ 1.) and the Membranes losing their Toughness when their Moisture is exhausted, the Chick very easily tears them, and breaks off that End of the Shell, to make its Way into the common Atmosphere. — The Mother having no Juices prepared within her Body, to give the Chick for Food after it is hatched, and its Organs for taking in and digesting Aliment being for some time too weak to supply it sufficiently with Nourishment, the *Vitellus* is made to supply these

these Deficiencies, till the Chick is sufficiently confirmed and strong (§ 44.), after which it is no longer the Subject of my present Enquiry.



Of the Nourishment of Plants while in a Foetus State.

THE first eight Numbers of the following Facts are taken from Mr. *Geoffroy* (a), and all the others, except one or two Observations of my own, are collected from *Malpighius* (b).

1. FLOWERS contain the male and female Organs of Generation of Plants.

2. THE male Organs are small Bladders, (the *Apices*) full of a very fine Dust, each Particle of which is of a particular distinguished Form in each Species of Plants.

3. WHEN this Dust or *Farina* is sufficiently ripe, the Bladders break with an elastick Force, and throw the Dust from them.

4. THE female Organ is the *Stylus*, *Pistillum* or *Tuba*, consisting of several Canals, which are open and wide at one Extremity,

(a) Memoires de l'Acad. des Sciences. 1711. (b) Anat. Plant. Cap. de Seminum Generat. & in Tractat. de Sem. Veget.

tremity, but in the other, nearest to the Stalk of the Plant, terminate in one or more Cavities where small roundish *Ovula* are contained.

5. BOTH Organs of Generation are contained within and protected by Leaves of different Make and Colour in different Plants, which Leaves are generally called the *Petala* of Flowers.

6. SOME Flowers contain both the male and female Organs, and therefore are called *Hermophradites*; others only contain one or the other kind, and thence are named *male* or *female*.

7. THOSE Flowers which are only male or only female, either grow both from the same Root, or the male only grow on one Plant, and the female upon another of the same Species; from which such Plants are said to be male or female.

8. WHEN the male *Farina*, or Dust, is prevented from having Access to the female Organs, either the *Ovula* do not increase into Seeds, or if they do grow, they are deformed, do not contain any *Germ* or *Rudiment* of the young Plant, and are not prolific.

9. WHEN the fecundated *Ovula* increase, the *Germ* or young Plant of each is seen lodged in a pulpy Substance named the *Se-*
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minal Leaves, which again adhere to, and frequently are sunk some way into a Depression of a Membrane, which forms a little Bag for containing a Liquor, and therefore this Bag is called the *Amnios*.

10. FROM the Side of this *Amnios*, opposite to that where the *Germ*, with its *seminal Leaves* is fixed, a Tube (the *Umbilicus*) goes out to be continued to the *Uterus*.

11. BEFORE the *Umbilicus* reaches the *Uterus*, it passes through a Cavity formed by another Membrane that is full of Liquor, or contains a great Number of small Vesicles distended with Liquor, and therefore is compared to the *Chorion*.

12. THE *Chorion* and *Amnios* become more and more turgid with Liquors for some Time; but then the Liquors begin to diminish, the *Chorion* being soonest emptied, and the Navel-string shrivels away till it can no longer be observed.

13. IN the mean Time the *Germ* and *seminal Leaves* increase apace.

14. AT last all the Liquors in the *Chorion* and *Amnios* are consumed, their Membranes contract and shrivel, the Seed is sufficiently large and confirmed; the small Peduncle by which it adheres to the *Uterus*, shrivels, turns hard and brittle, and the Seed falls off with the least Force.

15. THE Seed is composed of its Membranes or Teguments, of a large farinaceous Part, and of the small *Germ* joined to the farinaceous Substance by a small Peduncle, which is inserted into the *Germ* between the *Caulis*, *Stalk* or *Plume*, and the *Radicle* or small Root of this young Plant.

16. THE *Germ* is evidently the young Plant where the *Plume* and Root may plainly be seen.

17. WHEN the fecundated Seed is sowed at the proper Season, the farinaceous Substance soon becomes softer, and the *Germ* stretches its Stalk upwards, and its Root downwards.

18. The farinaceous Substance either remains under Ground, turning larger for sometime, but having its Substance changed more and more into a milky Liquor, or it is extended upwards, in form of one or two pulpy juicy Leaves, from these different Forms which this farinaceous Substance takes, it is called the *Cotyledons*, *seminal Leaves*, or *Lobes*.

19. AFTER some Time the *Lobes* begin to shrivel, and to have their Liquors consumed, and at last when their Juices are all wasted, they fade away and fall off.

20. THE Plant grows very fast all this time.

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21. When the *Cotyledons* are taken off before the Plants are put into the Earth, scarce any of them will vegetate, and all perish very soon.

22. THOSE that advance any after being thus deprived of their *Cotyledons*, increase rather in their *Plume* than Root.

23. WHEN the *seminal Leaves* are taken away, after allowing the Plant to vegetate so far as to come above Ground, it perishes in a little Time, the Roots generally fading first.

24. If the *Cotyledons* are taken away later, most of the Plants die, and those that continue to grow are always very small.

25. WHEN one *Cotyledon* is only taken away, the Plants do grow, but are not near so large or strong as the others that are left intire.

26. BY taking away the *Plume*, when it first sprouts above Ground, the Roots grow very large and quickly.

To fix an Analogy here between Animals and Plants, it will be necessary to determine how long either of them should be said to remain in the State of a *Fœtus*, which in my Opinion ought to be understood so long as the young Creature is nourished solely by Liquors furnished by the *Uterus* of the Parent; but as soon as it is

supplied any other Way, with all or any Part of its Nourishment, it can no longer be looked on as a *Fætus*.

If this is agreed on to be the distinguishing Character of a *Fætus*, it will be evident that we are only to regard Plants as *Fætuses*, while the Seed is ripening, and before the Earth, Water, Moisture of the Air, &c. have communicated immediately any Matter for its Increase; and in this Case it will appear most probable, That the *Umbilicus* pours in Liquors from the *Uterus* and *Chorion* into the *Amnios*, from which it is taken up by the Vessels of the seminal Leaves, to be conveyed partly into the *Fætus*, and partly into the Leaves themselves, by which the Plant is increased and its Parts are explicated, and a Substance is provided for nourishing it afterwards, when its tender Roots either can receive from the Earth very little, or any thing less than is necessary for the sufficient Growth of the Plant.

In running this Analogy between Animals and Plants, you'll observe a Mixture of the Mechanism of the viviparous and oviparous Animals in the Nourishment of the *Fætuses* of Plants; for the little Plant having, as in the viviparous Animals, a Communication with the *Uterus* of the Parent till
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it is fully formed, the whole Quantity of the Liquor it is to be nourished with, is not at first to be seen, as the Albumen is in the Egg; but the *Uterus* furnishes the Liquor to be gradually absorbed by the *Cotyledons* or *Placenta*: And then on the other Hand, Plants resemble the oviparous Animals, in so far as the Parent being incapable of supplying any Juices, prepared in its own Body after the *Fætus* is separated from the Womb, for the Nourishment of the Plant; and the young Plant not being in Condition for sometime to subsist entirely on the new Nourishment it must receive; the farinaceous *Cotyledons*, [or pulpy seminal Leaves do the same good Office to the Plant, as the *Vitellus* does to the Chick after it is hatched.

Since the Resemblance is so great between Animals and Plants, it would be superfluous, after what has been said of the former, to enter into a particular Detail of the Reasons of the foregoing *Phænomena* of Plants; and it is almost needless to say that I would conclude both the oviparous Animals and Plants to favour my Opinion of the whole Nourishment of all *Fætuses* being conveyed by particular absorbent Vessels, and not by the ordinary Canals, through which the Aliment must pass, after

the Creature is out of its *Fætus* State; for these are obvious to any who reads these Essays with the least Attention.



XI. *Practical Corollaries from the Essay on the Nutrition of the Fœtuses of viviparous Animals, by the same.*

BEING conscious to what Length the Essay on viviparous Animals had run out, I did not intermix any Account of morbid *Phænomena*, with the Description of the Parts, or with the Arguments concerning the Nourishment of the *Fætus*, which also would have had the bad Effect of diverting the Readers Attention from the principal Design; but considering how much such *Phænomena* may serve to explain and possibly confirm some Part at least of my Reasoning; and knowing how ill any thing that is not practical goes down with some People, I beg to be still further indulged, while I bring a few Examples to show that the Knowledge of the Structure of the Parts is absolutely necessary for understanding the Nature of Diseases; and that all Theory is not meer idle Speculation, but that Reason and Experience united, lay
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the surest Foundation of the Practice of Physick, (*See Art. XXV. of first Volume.*

I. SEEING the Vessels of the Womb and of the *Placenta* do not anastomose, (§ 16.) and Women have an erect Posture, and are subjected to periodical Evacuations from their *Uterus*, which has larger Canals opening into it, than are to be observed in other Animals, (§ 2, 3, 4, 5.) we may understand how much more liable Women are to suffer Abortions, than the Females of other Creatures are; for the Contents of the impregnated humane *Uterus* press more on the Orifice of the Womb to force it open, the superfluous Quantity evacuated periodically at other Times, is apt to thrust off the *Placenta*, and being poured into the Cavity of the Womb, either corrupts there, or forces open the *Os Uteri*; both which will probably occasion the Loss of the *Fætus*: Whence Women much more seldom conceive immediately before the *Menses* are to flow, than soon after that Evacuation is passed. Thence also we understand why *Loosening*, as the Women call an Appearance of Blood from the *Uterus*, is a Symptom that discovers great Hazard of Abortion.

II. NATURE endeavours to provide against the Inconveniencies mentioned in the pre-

preceeding Paragraph, by making the *Placenta* adhere sooner to the humane Womb than is ordinary in other Creatures; and by furnishing the humane *Fœtus* with a larger proportional *Placenta*, whereby the Adhesion is stronger, and on both Accounts the Evacuation is prevented.

III. WHEN there is the largest Quantity of the superfluous Liquors collected, the strongest Push must be given to separate the *Placenta* from the Womb; but the *Menses* are generally stopped after Pregnancy, and the Child is too small for some Months to consume them; wherefore Women are most exposed to Abortions in the third or fourth Month of their going with Child.

IV. WE see what Disorders are brought frequently on Women at each Period when their *Menses* are about to flow, and what Mischiefs almost constantly attend their Obstructions; and therefore need not be surpris'd at the Fainting, *Nauseæ*, Reachings to vomit, &c. that so often attack Women in their first Months of Pregnancy, some of which help to remove and prevent other Disorders; for by the Vomiting, for Example, not only an Evacuation is made, but less Chyle must be sent into the Blood-vessels, which therefore will have less of the superfluous Liquors. This again teach-

es us to remove or mitigate such Symptoms when they become very violent and dangerous, by proper Evacuations.

V. SINCE the Separation of the *Placenta* from the Womb must so evidently produce Abortion, we may see that this may be occasioned by very different Causes operating in various Manners, and requiring very different Treatment in preventing the Loss of the *Fætus*, when our Advice is asked timely.

1. Whatever occasions too great a Quantity of Blood to be sent to the *Uterus*, or assists or increases its *Momentum* to thrust off the *Placenta*; such as plentiful Living, Compression of other large Vessels, Frights, violent Exercise, Shocks of the Body, Fevers, &c. will bring a Woman into Danger of Abortion. The Cure however is plainly pointed out, to wit, Blood-letting, mild Food in small Quantities, and Rest.

2. When the Adhesion of the *Placenta* to the Womb is too weak, and the *Os Uteri* does not make a sufficient Resistance to its own Dilatation, whether these depend on the ordinary general Constitution of the Body, or on a particular Disposition of the Womb, or on a sudden Relaxation, as in Fainting, the same bad Effect, Abortion, may still follow; but the Cure must be very

ry different from what is to be used in *N. 1*. For here we must rely on Corroborants; and though much Exercise is at first to be shunned, yet if the Patient can by Degrees be brought to bear moderate Exercise, it will assist the other Medicines considerably.

3. If the Sinuses of the Womb are allowed suddenly to collapse, by the Want of a large enough Quantity of Liquors to distend them, as by the necessary Supplies to the Blood being withheld, or by violent Evacuations, especially Loss of Blood, not only the Weakness mentioned in *Numb. 2.* may follow; but the Vessels of the *Placenta* which have not been proportionally emptied, will be disengaged from the Excretories of the Sinuses, by their being deprived of sufficient Space to lodge in, and there is great Danger of Abortion. In such a Case we are to be on our Guard not to apply smart Stimulants to rouse the languid Mother too hastily; for such Medicines increase the Contraction of the Vessels of the *Uterus*, and will drive off the *Placenta* soon; but we ought to repair the Quantity of her Blood by mild balmy Food, with a Mixture sometimes of the least irritating Cordials.

4. All Causes that can produce a strong
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Contraction of the Fibres of the *Uterus*, or of the Parts that can press upon it, as for Instance, of the Diaphragm and abdominal Muscles, will be in Danger of forcing away the *Placenta*, and of opening the *Os Uteri*, whereby Abortion is occasioned. Therefore sharp Pains in any Part of the Body, and especially in or near to the *Uterus*, rough Emeticks, sharp acrid Purges, *Tenesmus*, Strangury, Piles, or such like, are every Day bringing on Abortion. The radical Cure is certainly to remove the Cause of the Pain or Irritation, which must be done by Medicines adapted to its particular Nature and Seat, which are too numerous to be mentioned here. If this cannot be executed so soon as we would desire, we are to lessen its bad Consequences as much as possible, by blunting its Violence, and counteracting its Effects. The first of these Indications will principally and most speedily be pursued in most Cases, (except perhaps in the inflammatory ones) by giving *Opiates*. The second Intention is answered, by diminishing the *Momentum* of the Blood, which Venæsection effectually does, and is always useful in the inflammatory Cases ; but is not so proper in some other Circumstances, where however the *Opiates* generally answer our Intentions.

VI. THE

VI. THE Liquors sent into the *Fætus* by the umbilical Vein not having their propelling Force communicated from the Mother (§ 16.), the State of the Mother's Pulse cannot affect the Child otherwise than by occasioning Abortion, or vitiating the Fluids that are to be absorbed; and therefore we may be convinced, how vain it is to pretend to account, in a physical Way, for the Impressions said to be made on Children by the Imaginations of the Mothers. We may hence also see, that Children may be infected with the diseased Juices of the Mother, but that it is possible for them to escape catching the Diseases of their Mothers, if either they are only topical, without affecting the whole Mass of Fluids, or even when the Mother's Blood is spoiled, the Child may be free of her Disease, if the morbid Particles are such as the Placental Vessels cannot absorb. This you see is in some Sense giving these Vessels a Power of chusing good or bad.

VII. THE *Placenta* is largest proportionally in the youngest *Fætuses* (§ 18.), by its being less capable of yielding to the stretching Power of the Contents of the *Uterus*, than the membranous Parts of the *Secundines* are; and thereby it is better calculated

culated for the greater proportional Growth of the *Fætus* when young.

VIII. THOUGH the Surface of the *Placenta* is not extended proportionally to the Increase of the *Fætus*, yet the Orifices of the Sinuses seem to keep up to that Proportion (§ 5.), therefore the Surface of Contact between the *Uterus* and *Placenta* rather decreases than turns greater; and a greater Quantity of Fluids is applied to that Surface. Which may be one Reason why the After-burthens of ripe Children are brought away more easily than those of Abortions.

IX. By being acquainted with the muscular Structure of the *Uterus*, § 6. we come to know how the *Placenta* separates more easily after the Child is born, than while it is yet contained in the *Uterus*; for as long as the Child remains there, the Womb is hindered to contract, upon which, and the want of a muscular Contraction in the *Placenta*, the Separation of the After-burthen depends. And since the Degree of Contraction of the *Uterus* will be proportional to the Distraction of its muscular Fibres, as happens in all Muscles, we may see another Reason, why the After-burthens of Abortions are more difficultly brought away than those of ripe Children; and we
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may observe, how reasonable the Use of *Pulv. ad Partum*, or other cordial stimulating Medicines, is, in such Cases, to hasten this Contraction, when there is no other some stronger Contra-indication, such as a Fever or Inflammation, to forbid their Use.

X. THE Sinuses of the humane Womb (§ 3.) are much more safe and useful, than any continued arterious Canals could have been; for these would have occasioned too great an *Hæmorrhagy* when the *Placenta* was separated, whereas, in the Way the small Branches of the Arteries are disposed upon the membranous Sides of the Sinuses, they must be compressed as soon as the *Uterus* contracts, and at the same time the Resistance, which the Womb occasioned to its own returning Blood by its Pressure on the large Veins, being taken off when the Womb collapses, the lateral Branches of the minute Arteries can be very little distended with Blood, and the Sinuses will be very little filled. To illustrate this, remark a very analagous Case, the oedematous Swellings of the Legs in Women with Child, which go off as soon as they are delivered. Hence we may be convinced that the only Means whereby we can save a Woman's Life whose *Placenta* separates before Birth is, to deliver her immediately

ly. And hence it is plain, why the *Lochia* or Cleanings gradually diminish in Quantity, and lose their red Colour.

XI. SEEING the Resistance to the Blood in the descending *Aorta* is taken off upon Delivery, and that not only the *Placenta* separates with more Difficulty when the Womb has not contracted itself, but also a greater *Hæmorrhagy* must happen, it will appear no Wonder that weak Women should be so liable to faint at this Time, especially if they have been kept in an erect Posture, and the Midwife is too anxious to bring away the *Placenta* soon. Hence we ought to learn to deliver such lying in a Bed or on a Couch; and the *Uterus* ought to be allowed some time to contract; and the Mother ought to have time given her to recover the Fatigue of her Throws, before the After-burthen is brought away. Hence also we may be convinced, how necessary soft Compression by Bandage is on the Belly after Delivery.

XII. WHEN the Quantity of the Mother's Blood is small, or when the Contraction of the *Uterus* is very quick, or when an Obstruction happens in the Arteries of the Sinuses, the Cleanings will be in very small Quantity. The Constitution of the Patient, and the State of the Pulse readily
Q. disco-

discover what the Want or too small Quantity of the *Lochia* depend on; and in the first Supposition there is no Harm from this Stoppage, but we do Mischief if we attempt to force them; but in the other Cases we ought to encourage this Evacuation, by soft relaxing internal Medicines, and by Injections, Foments, &c. applied to the Womb, or near it, while other Evacuations are promoted or made, if the Symptoms become urgent.

XIII. The Liquor of the Stomach being so thick (§ 30.) while all the digestive Powers of a Child are very weak at Birth, we may easily understand what bad Consequences, such as its sticking to the Guts, obstructing the Orifices of the Lacteals, &c. may be produced by this *Mucus* remaining there; and therefore ought to admire the Wisdom of our Creator, who has provided such a thin diluent purgative Milk at this Time, for preventing these Disorders, and may hence learn how necessary it is to cleanse the *primæ viæ* of new born Children by proper Medicines, especially when they are not suckled by their Mothers, and have not a Nurse whose Child is as young as themselves.

XIV. THE Want of Respiration to squeeze forward the Bile, and the Resistance

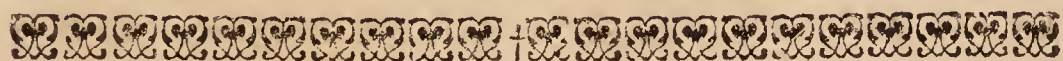
stance made to its Entry into the Guts of *Fætuses*, by the tough Slime which lines the intestinal Tube, make the Effusion of their Bile very slow; and therefore their Gall-bladder is generally full of a green sharp Bile. Hence at Birth, or soon after it, Children are often observed to have the *Jaundice*, the thick Slime producing the same Effects in them, as is disputed for from Stones in *Art. XXXIII.* of your first Volume. This Jaundice generally yields to any gentle Purgative, and very often is carried away by any Medicine that increases the Contraction of the Guts; which is no more than might be expected from understanding the Cause of the Disease. It is also from this Collection of Bile during Gestation, that Children are so frequently subject to Gripes and green purging soon after Birth, which cleanses their Guts of the unnecessary Slime and *Meconium*, and discharges that sharp Bile, which might bring on Disorders of worse Consequence if it continued to lodge there: So that however troublesome it may be to the innocent Babes, they are generally the better for it afterwards.

XV. FROM the Care bountiful Providence is at, not only to supply a sufficient Quantity of nourishing Juices to the *Fæ-*

tuses of Animals and Plants, but also to furnish Substances prepared by the Mother's Organs, for serving them after they are separated from her, *viz.* Milk in the viviparous, the Yolk in the oviparous Animals, and the farinaceous Substance of the Seeds in Plants: And from what we observe of Brutes, who follow the Dictates of Nature more closely than Man does, how they only gradually come to use the common Food of their Parents, we may be convinced that the Food provided by Nature, Milk, is the most proper for Infants; that a sudden Change of Food is dangerous to such tender Creatures, and that therefore the Food given Children when they are to be weaned from the Breast, should be such as is nearest to Milk, and the Breast ought to be taken only by Degrees from them. By which Method I have often prevented all the troublesome Disorders which generally attend Weaning.

XVI. FROM what was remarked above, (§. IV.) of the Disorders Women are frequently subject to when their *Menstrua* are about to flow, we may rationally conclude that a Nurse, who has such a Redundancy of superfluous Liquors, will have her Milk changed to the worse. And from what all Practisers in Physick have observed of the
Effects

Effects of deriving a more than ordinary Quantity of our Juices to one Part, in order to make a Revulsion from another, we have Reason to think that a Nurse whose *Menses* are brought on by any other Cause than a Superfluity of Liquors, will come not only to have less, but also worse Milk after such an Evacuation; and therefore a Nurse who menstruates, ought not to be chosen. But if particular Circumstances oblige us to continue a Child with such a Nurse, we ought to consider the Causes that occasion her *Menses* to flow, and according to these we are to order the Child to be kept up from the Breast, either before the Evacuation in the first Supposition, or for some Time after it, when it has been brought on by any other Cause.



XII. *The Brain forced by Coughing through the Cicatrice of a Wound of the Head, where a considerable Piece of the Cranium had been taken out. By Mr. JAMES JAMIESON Surgeon in Kelso.*

SOME Slates falling from the Roof of a House four Stories high, upon the Head of a Girl about thirteen Years of

Age, broke and shattered her *Cranium* at the Place where the sagittal and coronal Sutures meet, making a Depression of the Bone of about four Inches Diameter. The Symptoms attending this Accident were common, *viz.* an universal *Stupor*, bleeding at the Nose, Difficulty of Breathing, with a full irregular Pulse. I immediately took twelve Ounces of Blood from her Arm; and sent for all the Physicians and Surgeons of this Place, who agreed to trepan her speedily, which I performed. When I endeavoured to raise the depressed Pieces of Bone, they were all found separated from the neighbouring sound Bone, and therefore were all brought away, and so left a terrible Chasm in the *Cranium*. The *Dura Mater* was covered with a *Syndon* dipped in *Mell. Ros.* with a little Tincture of *Myrrh*, Pledgets wet in the Tincture were applied to the *Cranium*, and the other common Dressings were put on. Being laid in Bed, an emollient Clyster was injected, and procured two plentiful Stools; and before Night she recovered the Use of her Tongue, and all the other Parts of her Body, except the left Arm, which continued in a paralytick State for eight Days.

She was kept at a low Diet; and the Cure went very successfully on, and was com-

completed so far in three Months, that the Teguments were cicatrized.

On the fifth Day after her Wound, I had caused a Plate of Lead to be made for covering all the Dressings, and kept it on all the Time she was under my Care, with two Pieces of broad Tape put through four Holes, one on each Side of the Plate before, and the other two behind, tying the Ends under the lower Jaw, and behind the *Occiput*.

Notwithstanding the Wounds being skinned over, I recommended the constant Use of the Plate of Lead laid over a Compress upon the Cicatrice, to supply the Want of Bone; and she kept it on two Months after I left off seeing her; but then thinking herself secure, she laid it aside, and continued well seven Months more, when the *Chin-cough*, (*Tussis convulsiva*) then epidemick in this Place, seized her; and was so violent one Night when she was in Bed, that the Cicatrice in her Head was lacerated, and the Brain was pushed out at the Teguments. Being instantly called for, I found above two Ounces of the Brain lying on the Scalp: After cleansing this away, I applied Dressings with the Plate of Lead over them, thereby preventing a greater Discharge.

The Symptoms that followed this direful Accident were an intire *Paralysis* of the Limbs, she retaining still the Use of her Reason and Tongue, but much inclined to Sleep, with a low depressed Pulse and *Anxietas Cordis*, and her Urine was discharged involuntarily. In this Condition she continued five Days, and then died. Her Friends did not allow any Inspection into the State of her Brain after Death.

This Girl's Case will teach us how little we need be surpris'd at tormenting Headachs being brought on by frequent violent Coughing, when the Brain must be so strongly pressed on the *Cranium*.

We may likewise learn from the unhappy Accident that occasioned this Girl's Death, to be very cautious in supplying any Part of the *Cranium* that is wanting, especially after the Bones of it are so firmly joined as to prevent their yielding, and thereby enlarging the Cavity within them.

Since I did not open the Body, I can pretend to assign no Cause, why the Parts furnished with Nerves from the *Medulla Spinalis* should have been so much affected with Palsy in the five last Days she lived, while she retained her Speech and Senses, contrary to what might have been expected.



XIII. *The Cure of an Ulcer in the Cheek, with the superior salivary Duct opened. By ALEX^r. MONRO, Professor of Anatomy in the University of Edinburgh.*

MR. Ker of Frogton, a young Gentleman of a delicate Constitution, and threatned with a Consumption from an Ulcer in his Lungs, was seized, after riding in a cold Night, with a very hard Tumor about the Middle of his left Cheek ; which the Gentlemen who attended him endeavoured at first to resolve, but observing a Suppuration to come on, it was opened with a Lancet on the Inside ; and afterwards an external Orifice was also made, and Escharotics were applied to waste down the hard Stool of the Tumor that still remained. When no more Hardness was felt, his Surgeon endeavoured to incarn and cicatrize, but was disappointed by a constant plentiful Discharge of a thin clear Lymph. The Orifice was again enlarged, and it was dressed a considerable Time with Adstringents and Dryers in different Forms, but without any Success.

In

In *September* 1727, being accidentally in the Neighbourhood of *Kelfo*, where Mr. *Ker* lived, I was sent for thither, to advise with Drs. *Abernethy* and *Scot*, Physicians there, and with Mr. *Jamieson* Surgeon, concerning his Cure. The external Orifice in his Cheek was as large as would have received the Point of my Thumb, and at the Bottom of it we could distinctly see some Part of the superior salivary Duct laid bare, with a Hole in the Outer-side of it, large enough to allow the Button of a middle sized Probe to enter it; and when he moved his lower Jaw at our Desire, the *Saliva* ran out plentifully at that Orifice. When the Jaw was not moved, a very small Quantity of the Spittle ouzed out; but in Time of Dinner, it made a Napkin, laid eight fold over the Plaister that covered the Ulcer, wet all through.

We agreed to make an artificial Opening for the *Saliva* into his Mouth, which I did in the following Manner; Having with two Fingers of one Hand stretched his Cheek outwards; I directed the Point of a large Shoe-maker's Awl, which I held in the other Hand, into the open Breach of the Duct, and thrust the Awl obliquely forewards through the Cheek, into the Mouth, betwixt my two Fingers; then draw-

drawing back the Awl, I passed an eyed flexible Probe, mounted with a small Cord of Silk through the Passage made by the Awl, and brought it out between his Lips with my Fingers, leaving one half of the Cord hanging from the external Ulcer; then the Ends of the Seton being disengaged from the Probe, were tied loosely near the Angle of the Mouth; and his external Ulcer was dressed up with dry Lint kept on with a Plaister. He was desired to rinse that Side of his Mouth frequently with Brandy; and the Sides of the external Ulcer were kept from growing out too fast or turning callous, with the lunar Caustick. In less than three Weeks this Management had the desired Effect of rendring the Passage in which the Cord was engaged, callous, (which the looseness of the Cord, and the want of Pain when it was drawn plainly showed;) when Mr. Jamieson took out the Cord, and cured up the external Ulcer very soon. In a little Time after I saw our Patient here in *Edinburgh*, with a firm Cicatrice on the Part where the Sore had been.

This Operation is plainly directed by my Friend Mr. *Cheselden* in these Words (a),
“ When

(a) *Anatom.* Book 3. chap. 3.

“ When this Duct is divided by an external Wound, the *Saliva* will flow out on the Cheek, unless a convenient Perforation be made into the Mouth, and then the external Wound may be healed.” None however of the Chirurgical Authors whom I have looked into, give any Instance of this Operation having been formerly performed. My Success in this Case has encouraged me to attempt some Improvements in analogous Operations, which I shall probably communicate to you hereafter.



XIV. *A remarkable Extravasation of Blood after the Operation for the Hydrocele, by Mr. JAMES JAMIESON Surgeon in Kelso.*

A Gentleman about sixty Years old was afflicted with a *Hydrocele* in the left Testicle, which obliged him to have the Operation performed annually for four successive Years. I made the Perforation with a small dissecting Scalpel, and evacuated twenty three Ounces of Water each time, applying aromattick and astringent Medicines

cines to the *Scrotum*, with a proper suspensory Bandage, and recommending strengthening Diet and internal Medicines after some Doses of Purgatives. But he commonly neglected all the Prescriptions in a few Days after the Operation, and lived in an irregular enough Way.

In two or three Minutes after the Water was evacuated, when I performed the Operation the fourth time, about twelve Ounces of pure liquid Blood ran out at the Orifice in a full equal Stream, as from a large Vein, without the smallest Complaint of Pain or other Uneasiness; and then the *Hæmorrhagy* ceased of itself, with no other Assistance than bleeding him plentifully at the Arm, and the Dressings applied in the former Operations.

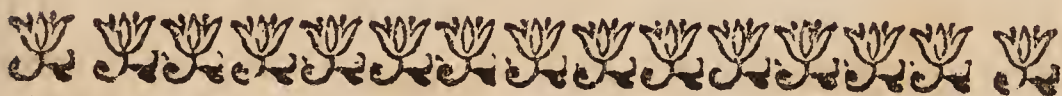
He informed me next Morning, that he felt a great Weight and Fulness in that Testicle, and all the Way from it up to his Groin; and upon taking off his Dressings, the *Scrotum* appeared bigger than at any time of the *Hydrocele*. In a Consultation with two Physicians, Drs. *Cranston* and *Scot*, it was agreed that I should make a large Incision in the *Scrotum* upwards from that made for the *Hydrocele*, to discover the State of the *Tunica vaginalis* and Testicle. When I had made a Wound about
two

two Inches long, we discovered the *Tunica vaginalis* of a natural Colour and Texture, but very greatly distended, and therefore determined to make our Incision thro' it also, having previously prepared all the Dressings for Castration, lest we should be obliged to perform that Operation. As soon as the *Tunica vaginalis* was cut, a great Quantity of thick coagulated Blood fell out, and by putting my Finger all round the *Tunica albuginea*, and upwards towards the Rings of the abdominal Muscles, I brought out a good deal more. Having then cleaned the Parts with an armed Probe dipped in warm Claret, we saw the Testicle, its Vessels and proper Coats in a sound Condition, which, with the Want of any *Hæmorrhagy* and the *Tunica vaginalis* contracting itself quickly, gave us Hopes of making a Cure without any further Operation. I applied Pledgets dipped in Claret Wine mixed with *Mel ros.* to the Testicle, and covered the rest of the Wound with Pledgets, on which common Digestive, with a small Proportion of *Bals. Peruvian*, were spread. Over which I put the Dressings formerly used in the *Hydrocele*. His Physicians confined him to a strict cool Regimen, and gave Directions for Evacuations by Bleeding, Clysters, or
for

for cordial Juleps, &c. as his Circumstances might require.

His Cure went on in the ordinary Way, without any troublesome Accident, and was compleated in three Weeks. The *Tunica vaginalis* growing every where so firmly to the *Albuginea* or proper Coat of the Testicle, that he had not the least Appearance of the *Hydrocele* during the three Years he lived after this Cure. The Cause of his Death was a Fever attended with an *Asthma*.

Quær. How or from whence this great Quantity of Blood had been extravasated.



XV. *A History of the Operation for an Aneurism of the Arm, successfully performed by Mr. JOHN MACGILL Surgeon in Edinburgh.*

THE *Aneurism* is a Disease which chyrurgical Writers pretend to describe with great Exactness, and to relate the several Symptoms by which the different Species of it are distinguished; while the particular Histories of this Malady, handed down by Observators, are so few and un-

accu-

accurate, that of late the Nature, Seat, and Symptoms of at least the true Kind, have afforded Matter of Dispute, which can only be determined by a Number of Observations. In the following Case I had a good Opportunity to remark exactly the Progress, *Phænomena* and Structure of what was judged by all the Physicians and Surgeons who saw it to be a *true Aneurism*; and therefore believe an Account of it will neither be unacceptable to you, nor improper to be inserted among the other Papers of your Collection.

James Forrest a Coachman, forty Years of Age, a heal strong Man, being thrown from the Coach-box, broke the Bones of his Right Leg, into a great many small Pieces; and a Gangrene coming soon on, there was a Necessity to perform the Amputation in the country Place where he then was. The third Day after this Operation he was let Blood of by a young Surgeon there, who opened the *Basilic* Vein of the Right-Arm. The Patient felt a very sharp pricking Pain, while the small Incision was made with the Lancet; and four Days after he observed a Tumor about the Bigness of a small Cherry at the Wound, which he believed to be the common one of coagulated Blood, called by Surgeons
Throm-

Thrombus; and therefore did not mention it to the Gentleman who performed the Amputation.

On the twelfth Day after his unfortunate Fall, he was carried to Town, and received into the *Infirmary*, where the Cure of his Stump went on as well as could be wished, without any Accident or Symptom to retard the Cure. After he had been eight Days in the Hospital, he told the Physician and Surgeon then attending, that he had some Uneasiness from a Swelling at the Bending of his Elbow. When it was examined, a Tumor appeared of an oval Form, as big as a small Hen-Egg, situated behind the *Basilic Vein*. The Skin over this Tumor was of a natural Colour; no Pulsation could be felt; and it adhered as firmly to the Tendon of the *Biceps Muscle*, as *Ganglions* commonly do to Tendons. Two Days after, a Pulsation exactly Synchronous to that of the Arteries, was distinctly seen and felt. When the Tumor was strongly pressed, it seemed to be less, but could never be made to disappear. There was scarce any Pain at this Part, either in moving his Fore-arm, or when the Tumor was handled.

A Consultation of several Physicians and of all the Surgeons who attend the Infirm-
R mary

mary being called, the Disease was unanimously determined to be a *true Aneurism*; but the Patient being still weak, it was resolved to try the Effects of artful Compression, and to delay the Operation till the Patient had Strength enough to undergo it, unless the Tumor seemed before that to be in Hazard of bursting. Graduate Compresses wet in *Oxycrate* were therefore applied, with the proper Bandage, which at first had an exceeding good Effect in diminishing the Tumor; but it soon after began again to increase; and then several Machines, such as that with a Screw for the *Fistula lacrymalis*, Mr. *Petit's Tourniquet*, &c. were used, but without any Success; on the contrary the Tumor still increased, and the Skin began to inflame; and a small Suppuration was brought on the most prominent Part of it. By laying aside these more forcible Machines, and returning to the Use of the former Compresses and Bandage, after covering the small superficial Ulcer with white Ointment, the Inflammation went off, and the Ulcer cured. The Tumor was now all firm and hard, scarce yielding at all to pressure, except at that prominent Point where it was soft, and where only the Pulsation could be felt, when the Fore-arm was

was

was bended; when the Member was extended no Pulsation could be observed any where in the Tumor.

The Patient was not yet sufficiently recruited, and therefore the Operation of the *Aneurism* was still delayed; but to prevent any Danger from the sudden bursting of the *Aneurism*, the *Tourniquet* was kept constantly applied to the Patient's Arm.

In the Beginning of *January* 1733, the Patient was judged to be strong enough to suffer the Operation, and the Tumor increased so fast, that there was great Danger of the Teguments yielding suddenly; and therefore the Operation was not to be delayed any longer. This happening to be the Month of my Attendance, I was of Course to perform, but previously brought all the Surgeons of the Hospital together, to examine the State of the Tumor, and to determine the Method to be followed in operating.

The Tumor was of a very great Bulk and Height, its Base extending internally as far as the internal Condyle of the humeral Bone, and externally it had pushed the Tendon of the *Biceps flexor cubiti* as far as the *cephalick Vein*; it ascended about three Inches along the internal Side of the *Biceps*, and descended as far below the

Joint of the Elbow, being also considerably prominent forward.

Being uncertain whether this Tumor was formed without the Artery, or if it was the Body of the Artery dilated, we determined to do the Operation in the most cautious, tho' more tedious Way, *viz.* by Dissection, having also all the Instruments and Dressings for an Amputation ready, in case there was no Hope of Success from the Operation of the *Aneurism*.

Having applied the *Tourniquet* in the common way to prevent any *Hæmorrhage*, the Skin was pinched up about the Middle of the Tumor, and cut with a Bistoury; then a small Directory being pushed into the fatty cellular Membrane, first upwards, then downwards, and to each Side, I cut upon it with a Bistoury, and thus made a crucial Incision on the whole Extent of the Tumor. After which I dissected the four Angles of the Teguments from the Tumor with a convex-edged Scalpel, stitching a cutaneous Artery that would otherwise have been uneasy to me. The Tumor thus laid bare, appeared covered at its upper Part with a thin cellular Membrane, but below it seemed to have a very strong tendinous like Coat, which we soon discovered to be no other than the *Aponeurosis*

sis of the *biceps* Muscle ; after separating the Adhesion this had to the Tumor below it with my Fingers, I cut it through to the lowest Part of the *Aneurism*, which now was all bare and full in View. The Coat of it was only a very thin tender Membrane, which appeared eroded, as well as the firm Substance it contained, at that prominent soft Part, where, as I mentioned before, the Pulsation only was to be felt. In endeavouring to separate the Tumor from the adjacent Parts with my Fingers, its tender Membrane was easily torn in several Places, and therefore, without insisting on such a Separation, I opened the Membrane from one End to the other, when several Ounces of a blackish gray coloured Liquor, like to Coffee made of half burnt Beans, ran out, and several Pieces of coagulated grumous Blood, and of *polypous* Concretions, fell down to the Floor. What remained was one large *polypous*-like Substance that weighed six Ounces, below which some Spoonfuls of that blackish Liquor, mixed with pretty pure Blood, were taken out with a Sponge. There were no Bridles or fleshy Beams stretched transversely from one Side of the Cavity to the other, but the humeral Artery involved in all its Coats came fully in View. About the Middle of

the bare Part of the Artery we saw a Hole, large enough to receive the largest Surgeons Probe, without any retorted Lips, or other Sign of the interior Membranes having been extended through the exterior, but exactly of the same Appearance as if it had been made by an oval sharp pointed Instrument. After by unloosing the *Tourniquet* a little we had made sure of what we saw being the wounded Artery, one of the Gentlemen who assisted me put in a strong Probe by the Orifice, and with it raised the Artery so, that I easily passed the *Aneurism-needle*, with proper Thread, behind the Artery, both above and below the Orifice, without engaging the Nerve or Vein within the Thread. I made the two Ligatures in the common Way, the Patient complaining much of Pain while I tied the superior Threads, and then untwisting the *Tourniquet*, only some few Drops of Blood ouzed out at the Aperture in the Artery; and the other common Dressings and Bandages were applied.

The *polypous* Lump we took out was very hard and firm on the Side next to the Skin, except where I said already it was eroded in the Middle, but turned softer in a *lamellated* Way as it approached the Artery,

ry, till it degenerated gradually into meer coagulated Blood.

During half an Hour after the Dressings were applied, the right Hand remained cold and scarce sensible, but gradually then recovered Sense and Heat. Next Day that Hand was a little swelled, and on the second Day became so big, as to oblige me to take off the thick Compress that was pressed on the humeral Vessels by the exterior Bandage, after which, and fomenting the Hand with warm Water and Brandy, the Swelling decreased.

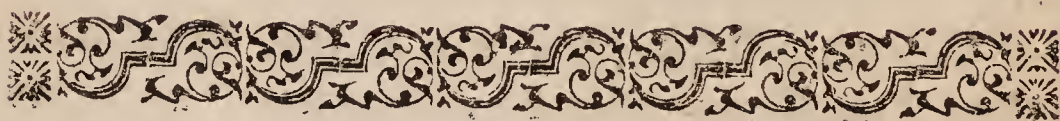
On the fifth Day after the Operation the Dressings were removed, and the Wound began to suppurate in a very right Way, and was cured intirely before the End of *March*, without any Accident, unless that on the 22d of *January* Blood made its Way through all the Dressings. It had come out from the Hole of the Artery, but stopp'd as soon as the Dressings were removed; and no *Hæmorrhagy* ever happened afterwards. In the time of the Cure, the Hand often became *oedematous*, and sometimes a gentle *Erysipelas* attacked the Skin of it, but soon yielded to an Embrocation with the *Aq. Mindereri*, or to *Aq. Calcis* with some Brandy. The Threads with

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which

which the Artery had been tied did not come out till the Middle of *March*.

We never could feel any Pulse below the Elbow since the Operation. The Member is weak, but he can perform the Motions of the Fore-arm, Hand and Fingers. He still complains of a Numness and Difficulty of Motion in the Thumb and Fore-finger more than in any of the rest, though it is now two Months since the Wound was skinned over.



XVI. *REMARKS on the Coats of Arteries, their Diseases, and particularly on the Formation of an Aneurism, by ALEXR. MONRO, Professor of Anatomy in the University of Edinburgh.*

THE curious and accurate Account of the *Aneurism*, which was shown to me before it was sent you by a Gentleman, to whom I stand indebted for many obliging Acts of Friendship; and Mr. *Macgill's* Desire that I would endeavour to explain the Nature of this Disease, which appears neither to have been exactly examined, nor rightly understood by surgical

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Writers, have given Rise to the following Remarks on the Coats of Arteries, their Diseases, and particularly on the Formation of the *Aneurism*; and as a Sequel to this, I shall soon lay before you some Figures of the Arteries of the Arm, accompanied with a few Reflexions on the *Aneurism* occasioned by Venæsection, which is by much the most frequent that admits of any Cure.

In several Parts of the Body, Arteries receive a strong firm Covering from the contiguous Parts, which has been described as their exterior Coat, such is, the Membrane that surrounds the *Aorta*, as it comes out of the *Pericardium*; the *Pleura* and *Peritonæum* spread over the descending *Aorta* in the *Thorax* and *Abdomen*, &c. But seeing this Coat is only to be observed in some Parts, where particular Purposes are to be served, such as strengthening an Artery, where it is more than ordinary exposed to the stretching Force of the circulating Fluids, counteracting the Resistance made by some solid Body on its opposite Side, saving it from Compression, &c. I think it ought not to be considered when we speak of the Coats of Arteries in general.

All Arteries are covered externally with a cellular Substance, composed of very fine pelli-

pellucid Membranes, which are capable of being stretched, even suddenly, to a great Extent without breaking, and they collapse as quickly when the stretching Force is removed. There is always more or less of an oily Liquor contained in the communicating Cells of this Substance, and the proper Vessels of the Arteries run in it, spreading Branches every where on the Cells for the Secretion of that Oil. When either the Membranes are distended by a Liquor thin enough to enter the Cells, or when the exterior Part of the Membrane is gently drawn, the cellular Texture is very evident; but when a gross Substance is forced into the more internal Part of this cellular Membrane, it conceals the fine Threads of the Membranes mixed with it; and whenever the Cells are empty, they collapse so close together, that the whole appears to be one membranous Coat, consisting of several Layers.

All Arteries are surrounded with such a Substance as I have just now described; and therefore it may be reckoned one of their Coats; tho' I must observe, that the same kind of cellular Substance is common to at least all the flexible Parts of the Body, where every little Fibre is connected to another by the same Contrivance. See

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Boerhaave's Preface to his Edition of the Autores varii de morbo Gallico.

This cellular Substance of the Arteries serves to connect them to the surrounding Parts, without hindering or disturbing their Actions or Motions, it prevents their being so readily compressed; it gives a safe Passage to the Vessels of their other Coats, it contains Oil for lubricating and keeping the interior Coats flexible.

What really deserves to be called the first proper Coat of the Arteries, is the muscular or tendinous, which in the humane Body at least consists of annular Fibres connected strongly together. It is to these principally that the recoiling of an Artery is owing, after it has been distended by the superior Force of the *Systole* of the Heart, and the Elasticity of the Substance connecting the annular Fibres, which is of the cellular Kind, is very remarkable in the quick Contraction of an Artery, after it has been stretched longitudinally.

The most internal Coat of Arteries cannot be rightly observed while they are found and recent, because it is so thin, and adheres so firmly to the muscular Coat, that it appears in Form of a very thin Layer of longitudinal Fibres; but after the Arteries are kept some time, and their Texture

ture becomes more easily unravelled by the beginning Putrefaction, it separates very easily, and shows numerous Inequalities on its interior Surface, with Vessels dispersed on it, and a cellular Substance is seen connecting it to the muscular Coat, but there is no Appearance of any muscular Structure in it, and it tears very soon upon attempting to distract or stretch its Fibres ; so that it would seem to bear a very strong Resemblance and Analogy to the villous Coat of the Intestines, whose proportional greater Distensions and Contractions above what Arteries ever suffer, and thicker *tunica cellularis interna*, will account for the *Papillæ* and *Rugæ*, so much more observable in the Guts than the Arteries. I suspect it must be this Coat which Mr. Winslow (a) calls the *Duvet*, which he affirms he saw filling up the Cavity of the small secreting Arteries of the Glands, and on which he builds his Account of Secretion. I imagine it a Membrane analogous to this, which, divested much of its cellular Substance, forms the Valves in the Veins.

This interior Coat will prevent any Particles of our Fluids from insinuating themselves

(a) Mem. de l'Acad. des Sciences, 1711.

selves into the cellular Substance of the other Coats, it renders the Surface of the Arteries more smooth and polished than otherwise it would be; and we may conclude from the Analogy of other Parts, that its Vessels separate a Liquor to protect and lubricate its own interior Surface.

From the Texture of the external cellular Coat of Arteries, as above explained, it is evident, that Obstructions are very apt to be formed here, which, according to the different Series of Vessels in which the Obstruction is, and the different Natures of the obstructed Liquors, will produce various Diseases, as well as in the *Tunica cellularis* elsewhere in the Body, which is the Seat of numerous Diseases that are said by Authors to affect other Parts. To take but one Example of the many which *Boerhaave* (a) names, here it is that Inflammations are placed, this it is that melts down into *Pus* in all Suppurations. Let Surgeons reflect whether ever they saw the proper muscular Fibres dissolved into *Pus*, or if firm Membranes, Ligaments, the Skin, &c. do not cast off in Sloughs when they are eroded. Let those who examine
the

(a) Præfat. in Autores de morbo Gallico.

the Bodies of People dead of Pleurifies, inflamed Guts, &c. remark whether the Membranes said to be affected are not intire, and the *Pus* is not collected in the cellular Substance under the Membrane. But to return to the present Subject, the Diseases of the external cellular Coat of Arteries may serve to diminish the Diameter of the Artery, if they compress it. If the Oil in the Cells becomes too thin, or only Lymph is contained in them, the muscular Coat may be too much relaxed. If there is too small a Quantity of the moistning Liquors, the Artery loses that Flexibility that is necessary for it; and if the morbid Matter becomes acrid, it may erode or destroy the muscular Coat, though this will be done with Difficulty, because of its firm Texture. Hence we daily see large Arteries long soaked in the *Pus* of Abscesses without any *Hæmorrhagy*.

The muscular Coat will be subject, as well as other Muscles, to too great Rigidity or Laxity, to convulsive Contractions, or paralytick Affections, though these will not show themselves evidently because of the Action of the Heart upon the Artery, and of the Elasticity which this Coat has independent of the Circulation.

What was said of the Texture of the most
in-

internal Coat, will naturally lead one to think that it must be subject to Diseases, and that these will be much a-kin to the Maladies of the external cellular Coat, Allowance only being made for the violent Compression, which the internal one must always suffer, from the impetuous Stream of Blood on one Side, and the brisk Re-action of the muscular Coat on the other; the Effects of which may be readily enough understood, from what I have had Occasion to say elsewhere (*a*) on such Compression. It is in this Interior Coat only that ever I saw any of the bony or calculous Concretions of Arteries. I have more than once observed the Cavity of a large Artery almost blocked up by a steatomatous Thickening of this Coat, and frequently I have observed purulent Matter collected in it.

Notwithstanding the morbid State of this Coat offers itself so frequently to the View of those who dissect the humane Body, practical Authors and Observators have not been at Pains to remark how far the animal Oeconomy was thereby disturbed. I offer the few following conjectural Queries to their Consideration. May not Diseases here often occasion great Inequalities
and

(*a*) Accounting for Ossification in the Anatomy of the humane Bones, Part 1.

and Irregularities of the Pulse? May not a *Tabes purulenta* have its Seat here, without any Bowel being affected? Will not a small Erosion of this Coat, and a consequent ouzing of the Blood through the cellular Texture of the other Coats, more naturally account for the *Ecchymoses* that happen so frequently in Diseases, where the Blood is acrid, than breaking of the Vessels can do? Are not the small Vessels where the Motion of the Fluids is slowest, more liable to suffer this Erosion than the larger ones are?

The preceeding Account of the Coats of Arteries may let us see that no *Aneurism* can happen, unless through some Fault of the interior Coats; therefore it will be necessary to take a View of the several Ways these Coats may be so vitiated, as to give any Chance for the Formation of an *Aneurism*.

1. A large Opening made into an Artery, with a proportional Aperture in the Teguments, produces only an *Hæmorrhagy*; but if the external Orifice in the Skin is so small, as not to allow the Blood to escape as fast out at it, as it flows from the Artery, the neighbouring cellular Membranes will soon be filled with Blood; the Member becomes every where swelled and discolour-

coloured; and, in short, what is generally called a *Bastard Aneurism* is formed.

2. If the Aperture into the Artery is very small, and the Blood cannot escape through the Teguments, it will coagulate before it can be pushed to any considerable Distance from the Orifice by which it escaped, and thereby an Obstacle will be made to the succeeding Blood's spreading in the *Tunica cellularis*, which soon will be formed into a lamellated Membrane, by the Oil being squeezed out, while the extravasated Blood becomes firmer and harder, so as to appear of the *Polypous* Consistence, by the Pressure it suffers. I had sometimes Occasion to be much surpris'd at seeing how soon such a Change can be brought on the arterious Blood; the Instances I mean are, where after a Limb was amputated, the Patient's Faintness hindered the Arteries to spring as usual, by which one lay undiscovered, and was not stitched, but in a few Hours after the Dressings were put on, occasioned a *Hæmorrhagy*, notwithstanding the Bandages had been tightly applied, and a Prentice pressed strongly with his Hand on the End of the Stump. When the wet Dressings were removed, I saw the clotted Blood on them become firm, of a pale Colour, and having the Appearance
S of

of a fibrous Texture. Since then such coagulated Blood is contained in a membranous Substance, the Disease in the Case we have supposed will have the Appearance of a circumscribed incysted Tumor, which the Pulsation of the neighbouring Artery and the Jet made at its open Orifice will communicate a Pulsation to, till either the Bulk of the Swelling, the Quantity of Liquor below the *Coagulum*, or the great Resistance of the Parts stretched on the Tumor, render the Vibration imperceptible; and till once the Polypous Concretion turns very large, the Tumor will become much less on compressing it strongly, by the fluid Blood being forced back into the Artery through the Perforation in its Coats; that is, a Tumor, attended with all the Symptoms of what is called a *true Aneurism*, is formed, though the principal Part of the ordinary Definition, *viz.* the Distension of the proper Coats of the Artery is wanting.

3. If the muscular Coat only is perforated, the interior Coat will be pushed out at the Interstice of the divided Fibres, and not being capable of being stretched far without breaking, the Case is soon reduced to one or other of the two former Suppositions.

4. If

4. If Part of the muscular Coat only has suffered a Solution of Continuity, the remaining Fibres are either able to resist the Force of the Blood without being distracted beyond their natural Tone, in which Case they will reunite, especially if they have been divided by a sharp Instrument cutting transversely; but when there is Loss of Substance, or a longitudinal Incision, the Breach can only be made up by *Syssarcosis*; but in neither Case will either sort of *Aneurism* happen, unless more Fibres afterwards yield to bring it to be no longer able to resist the impetuous Blood, as I think would for most part follow, from what I have seen in trying some Experiments for observing what happens in an Artery taken out of the Body when it is filled with Quick-silver and pressed, after some of the muscular Fibres have been cut or broke. If either then the Fibres continue to break gradually, or the Distension of them is sudden, when all are torn the Disease is reduced to the Supposition made in § 1. and 2.

5. When Part of the Fibres are broke, cut or eroded (any of which ways you may conceive the Solution of Continuity to be made on all the Suppositions yet mentioned) we can imagine such a Proportion to remain intire, as being very near, but not

altogether able to resist the Fluids, will yield very gradually, and form a true *Aneurism*, in the Sense the common chirurgical Books explain it: But besides the many Chances against such a precise Approach to an *Equilibrium* happening between a laxed Artery and its contained Liquor, I must observe, that though Membranes become stronger and thicker as they are gradually stretched, yet muscular Fibres separate more and more leaving larger Interstices, and therefore, if the annular Fibres of an Artery were thus separated, the interior Coat would soon yield in their Intervals, and the Blood would burst out to form one or other of the Tumors described § 1. and 2. and when it is confined, as in § 2. the circular Fibres would appear like so many Columns or cross Bars in the Tumor; which agrees very well with several Descriptions of *Aneurisms* handed down to us.

6. If a small Part of the muscular Coat of an Artery loses its natural Tone or contracting Force by any paralytick Disorder, it will yield to the stretching Force of the Blood; and thus an *Aneurism* may be formed, which will have all the Characters of what is commonly named a *true Aneurism*. You see, that a partial Palsy, and
that

that very gradually coming on, must be here supposed; otherwise the Fibres being separated, and the internal Coat breaking, will reduce it soon to the State mentioned in § 5; and indeed it would appear from what is there said, that before it becomes of any very considerable Bulk, we have reason to judge the same would happen here. Besides, such a Palsy as has been here supposed will very rarely be formed, because of the great Sympathy and Connection which the whole arterious System has, the pulmonary Artery and *Aorta* making each one hollow Muscle continued from the Heart to their small Ramifications: And I believe a Palsy is seldom or never observed to affect only one Extremity, or the Middle of a Muscle, while the other Parts of it continue to be vigorous and active.

7. The only Supposition we need make concerning the interior Coat of Arteries alone being affected is a Solution of its Continuity, which will readily happen by all sudden over-stretching of an Artery, or it may be made by any eroding Causes, such as Suppuration, &c. I cannot say positively, that the Want of this Coat is capable of producing an *Aneurism*, but shall offer a Conjecture which may possibly be improved afterwards by Observation; it is

this, When this Coat is removed, some Particles of our Liquids may insinuate themselves into the cellular Membrane connecting the muscular Fibres, and gradually enlarging these Passages, at last penetrate through it, and are diffused in the external cellular Coat : And thus at length this Case is reduced to what is mentioned toward the Close of § 5. I was brought into this way of thinking, partly by observing how readily cellular Membranes transmit Liquors, and by seeing Air escape through all the other Coats of the Guts when the villous one is removed.

From the whole we may see, that what Authors call now-a-days a *true Aneurism* will very seldom be formed ; which may be still further confirmed, by mentioning the remoter Causes which are agreed on by all to occasion it for ordinary, these are, Wounds, Bruises, Straining, loud Laughing, Crying, &c. All such you see make a sudden violent Effort on the Arteries, and therefore do not rightly answer to any of the Suppositions we made of the Manner this Disease could possibly be brought on. And to establish what you see I argue for, of the true *Aneurism* being a very rare Disease, I perused a considerable Number of Histories of *Aneurisms*, besides those
men-

mentioned by Dr. *Freind* (a), and could not find above two or three that were dissected, so much as alledged to have been true *Aneurisms*; and there was not one, where it is said, that the *aneurismal Sac* consisted of strong annular muscular Fibres, which must however be the true Criterion whereby the true *Aneurism* can be known, seeing from what was said in § 2. confirmed by several accurate Histories, Blood extravasated in the *Tunica cellularis* will have all the other Symptoms that are described as proper to the true *Aneurism*.

(a) History of Physick, Vol. I.



XVII. *Reflections on the Aneurism occasioned by Blood-letting. By the same.*

THE Figures herewith sent will give a better Idea of the Situation and Course of the Arteries of the Arm that are the Subject of the following Reflections, than any Words can; and therefore I shall not trouble you with any verbal Description, but shall proceed to the Explication of *Table II.*

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Fig.

Fig. 1. represents the most ordinary Distribution of the humeral Artery.

1. A Part of the *pectoral* Muscle.
2. The *Biceps flexor cubiti*.
3. The *Coraco-brachialis* Muscle.
- iv. The *Brachæus internus*.
4. The *Brachæus externus*.
5. The *Brevis* and *Longus Extensor*.
6. The *Pronator radii teres*.
7. The *Supinator radii longus*, and *Extensor carpi radialis* drawn outwards by a Thread.
8. The *Supinator radii brevis*.
9. The *Flexor carpi radialis*.
10. The common Origin of the *Palmaris longus* and *Flexor carpi ulnaris*.

A The Trunk of the *humeral Artery* giving off Branches in its Course to the neighbouring Muscles.

B The Place below the Joint of the Elbow where it is about to split into its two large Branches.

C The *radial* Branch.

D The common Trunk of the *ulnar* and *median* Arteries.

E A Branch going off from the *humeral* Artery above the Elbow toward the internal *Condyle*, behind which it anastomoses sometimes by a large Canal with a Branch sent up from the *Ulnar*, oftner they communicate

municate by a great many small Branches, and frequently I could not discover any Conjunction of these two Arteries.

F The Part of the *humeral* Artery where it commonly begins to be covered by the *Aponeurosis* of the *Biceps* Muscle.

G A Branch sent up from the radial Artery behind the external Condyle of the *Os humeri*, to anastomose with such a Branch of the *humeral* Artery as E is.

The same Parts are pointed out in the three following Figures, by the Letters and Cyphers employed in the first Figure, which makes a Repetition of their Explication needless.

Fig. 2. is borrowed from Mr. Cowper's Scheme of Arteries (*a*).

α is a Branch sent off from the *humeral* Artery, to anastomose behind the internal Condyle of the *Humerus* with the Artery β , which comes from the Trunk of the *ulnar* and *median* Arteries.

H The *ulnar* Artery.

I The *median* Artery.

k Branches given to the Muscles of the Hand from the *humeral* Artery just as it is about to split into its Branches.

Fig.

Fig. 3. shows the *humeral* Artery dividing into two great Branches as it is coming out from the Arm-pit. These Branches are represented as if they lay at each others Sides, which the oblique View I gave of them to the Painter obliged him to; but the one γ , which afterwards becomes the *radial*, is placed directly anterior to the other in the Subject, the *ulnar* δ lying pretty close to the Bone.

Fig. 4. represents the *humeral* Artery splitting near the Middle of the Arm, ϵ being the larger anterior more superficial Branch which goes on to divide as the *humeral* Artery in *Fig. 1.* does, while the lesser Branch ζ runs close on the Bone to open into the common Trunk of the *ulnar* and *median* Arteries.

H The *ulnar* Artery.

I The *median* Artery.

L The Branch marked β in the second Figure.

Not. The Muscles 6, 9, 10. are here cut through, and hang over the Cubit, while those marked 7. are drawn outwards, that the Arteries might be distinctly seen.

I still preserve the Arms represented by *Fig. 1, 3, 4.*

By the Distribution of the *humeral Artery* in *Fig. 1.* it would appear, that the Artery which is in Hazard of being hurt by the Lancet in Blood-letting of the Arm, is for ordinary the Trunk of the *humeral Artery*, and that the Lancet must pierce the tendinous *Aponeurosis* of the *biceps Muscle* before it touches the Artery. To be still more assured of this, I pushed Pins into the Arms of several Bodies at the ordinary Place where the *Basilick Vein* is opened, and where the Cicatrices of former Venæsections were seen; and allowing the Pins to remain there, I dissected the Parts till I saw what has been above asserted to be true.

Sometimes when the *median Vein* is opened lower than ordinary, the *radial Artery* may be hurt, but then its Wound must be so near its Rise from the Trunk, that it is impossible to make any Ligature on the *radial Artery* above the Aperture; and therefore, seeing the *humeral Artery* must be tied, if the Operation of the *Aneurism* is performed, the Consequences will be the same as if the *humeral Artery* had been wounded.

In

In all Patients then whose Vessels are distributed in the common Way, without any considerable *Anastomosis* between the *humeral* Artery and its large Branches in the Fore-arm, it is in vain to expect that any Pulse should be felt at the Wrist, after the Operation of the *Aneurism* is performed; and at the same time, the Want of a Pulse there, needs not make the Surgeon go on precipitately to the Amputation of the Member, because the numerous small *Anastomoses* may be sufficient to keep Life in it, and may possibly be gradually enlarged so much, as to restore Vigour and Strength to it.

When the Operation of the *Aneurism* is performed at the Bending of the Elbow to one who has the *Anastomosis* represented in *Fig. 2.* the *humeral* Artery must be tied, but the Pulse at the interior Side of the Wrist will continue, and probably that on the exterior Side will soon be restored, because the Blood may have the short retrograde Motion from the Insertion of the anastomosing Tube into the *ulnar* Artery, to the Place where the *radial* Artery begins, without any great Diminution of its *Momentum*.

Those who happen to have such a Division of the *humeral* Artery as is represented in

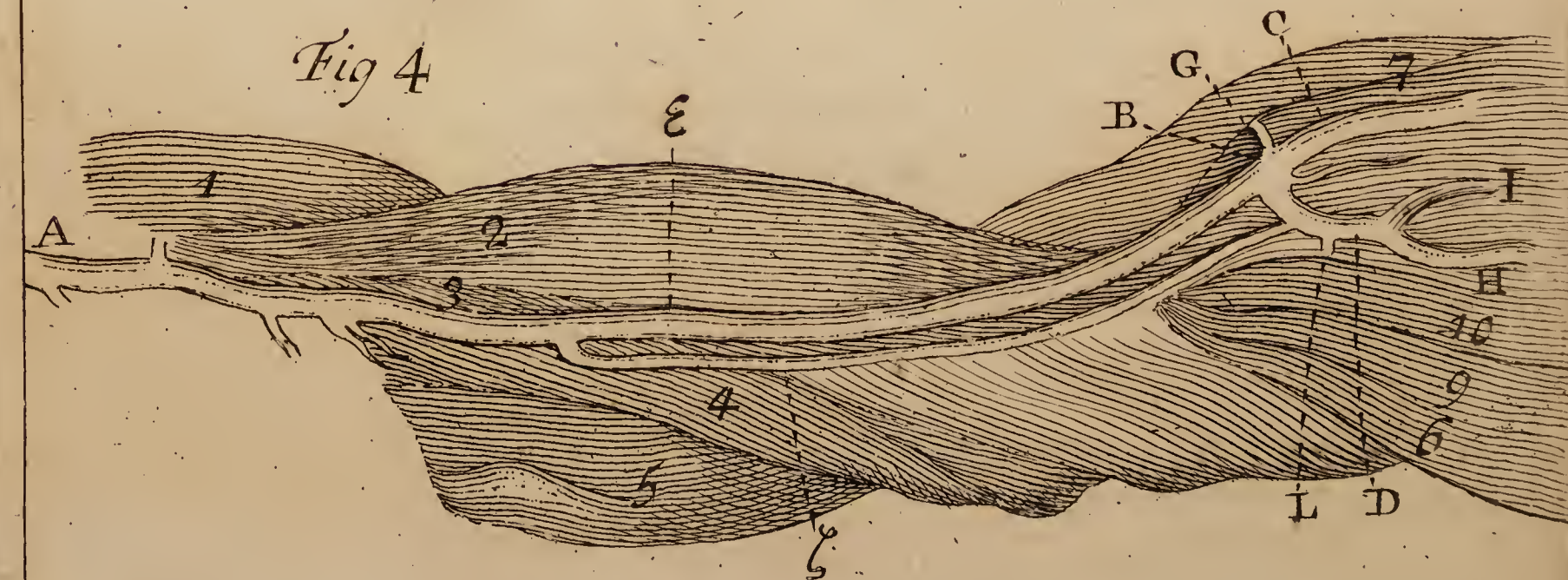
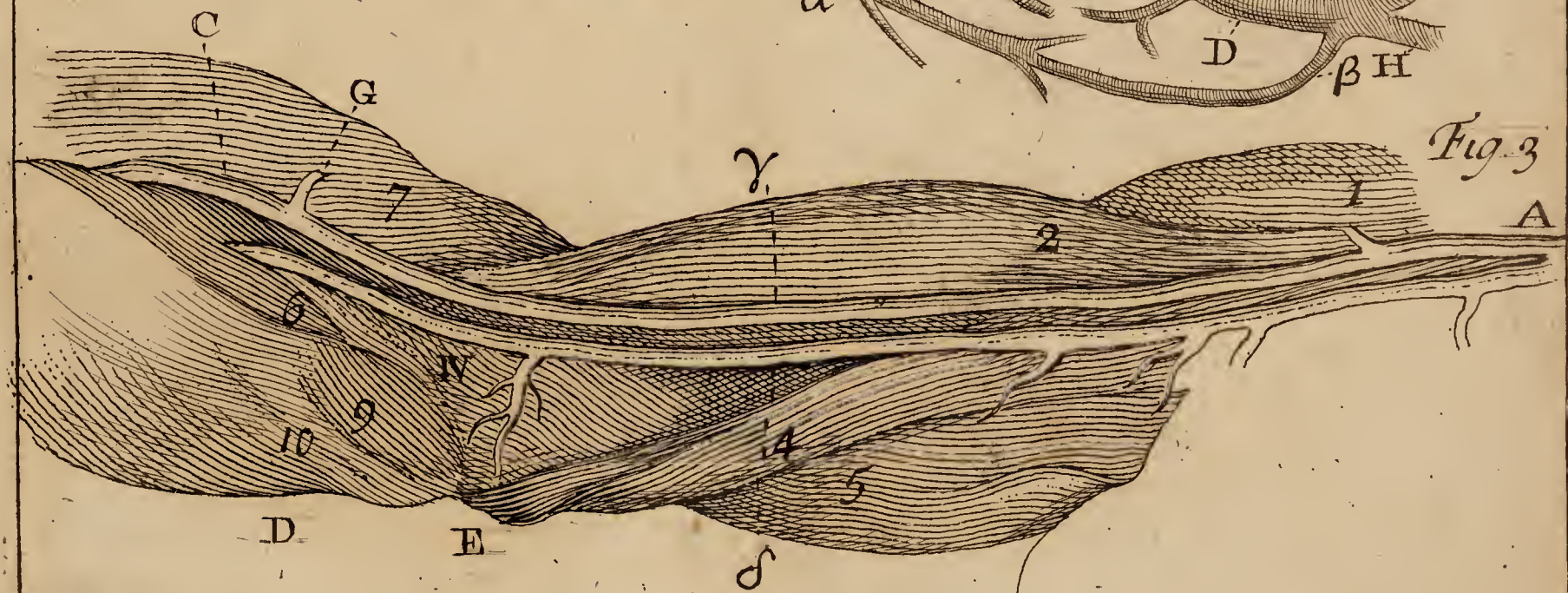
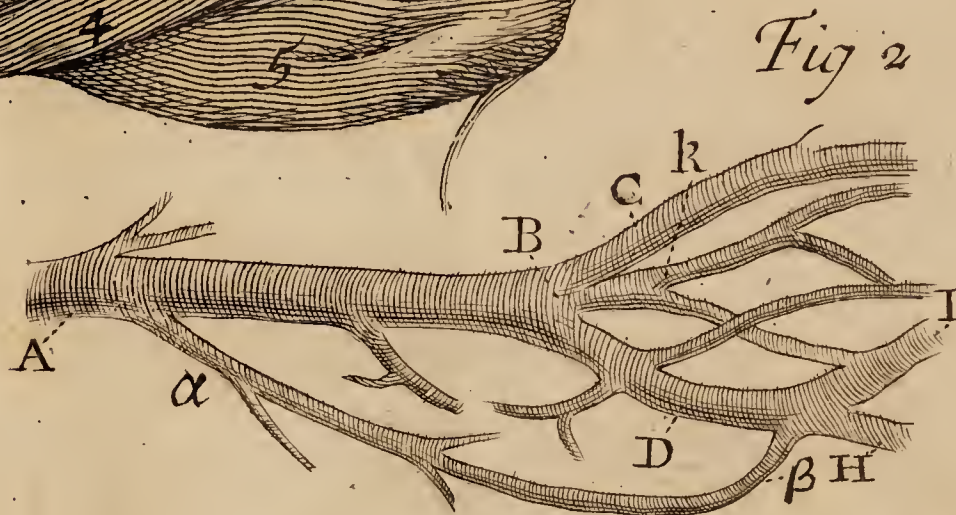
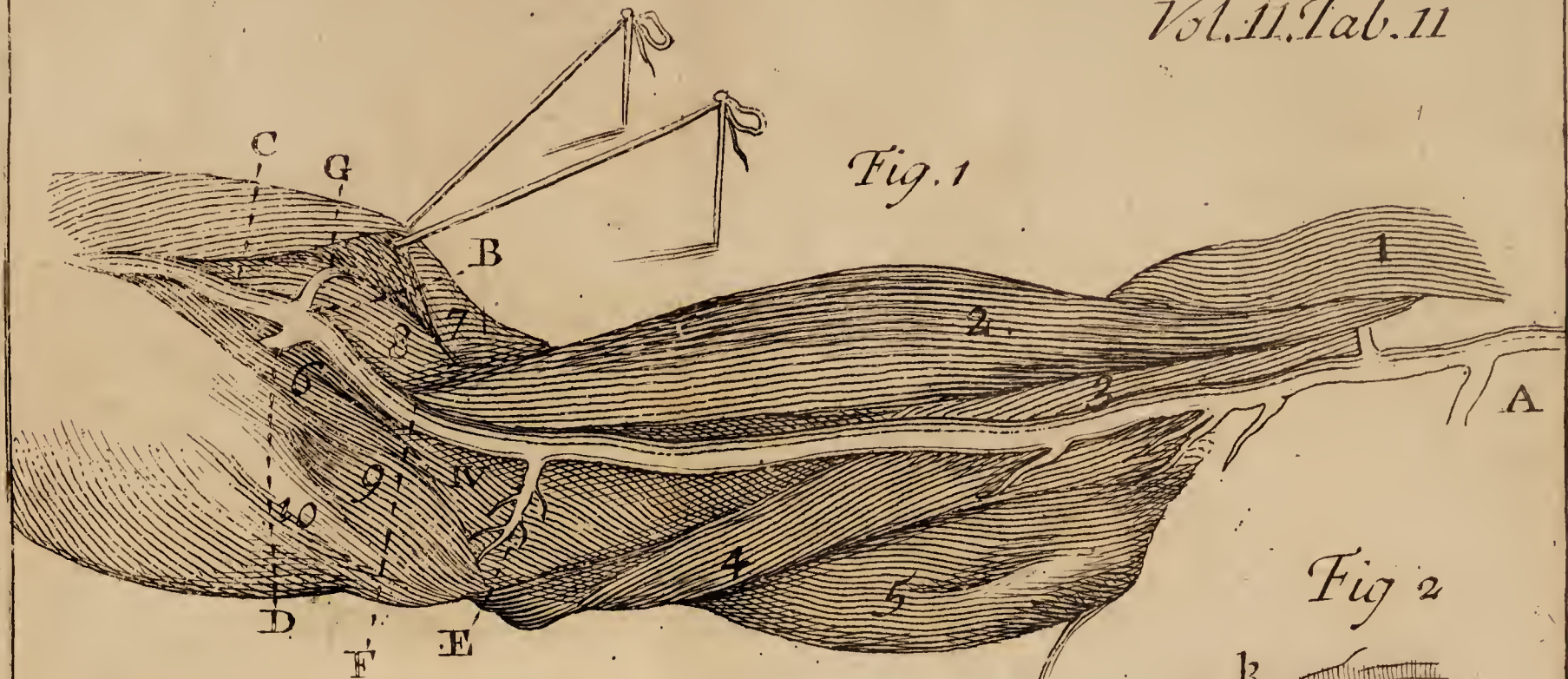
in *Fig. 3.* can only have the *radial* Artery hurt in Venæsection, and after the Operation of the *Aneurism* will have a stronger Pulse than formerly in the interior Side of the Wrist, but will probably want it in the exterior Side.

If the Vessels anastomose as in *Fig. 4.* you'll readily see, that the anterior Branch only being hurt, the Operation of the *Aneurism* may be performed without interrupting intirely the Course of the Blood either in the *radial* or *ulnar* Artery ; and therefore the Pulse may still be felt in the common Place on both Sides of the Wrist.

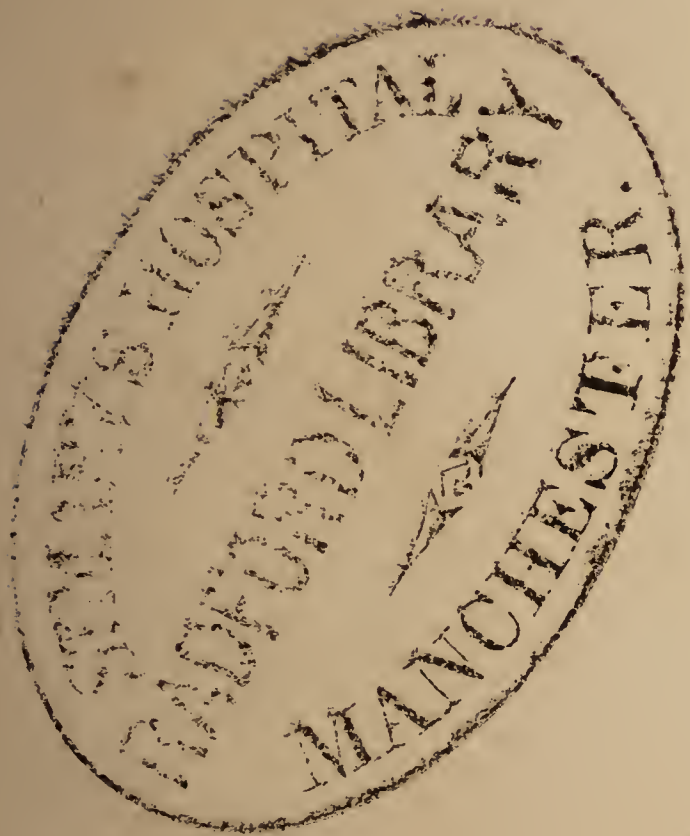
I have very little to add, by way of Remarks on the History related by Mr. *Macgill*, having in the Account already given of the Formation of *Aneurisms* prevented any Explication of the principal *Phænomena*. I may however observe, that in that History we can trace the gradual Formation of the *Polypus*, and from the Mixture of the deeper coloured Parts of the Blood then squeezed out, with some of the dissolved cellular Membrane, may understand how a Liquor like to Coffee made of half-burnt Beans could be collected within this *Aneurism*.

If the common Notion of the *true Aneurism* being a *Sac* formed by the dilated muscular

scular Coat of Arteries has not had its Rise from Theory only, I would suspect that the first Asserters of it seeing the *Pleura* covering an *Aneurism* in the *Thorax*, or the tendinous *Aponeurosis* of the *Biceps* here in the Arm adhering firmly to such a Tumor, mistook them for the muscular Coat of the Artery. I have an Argument for this Suspicion which seems very strong to me, whatever it may do to others who are less liable to mistake one Thing for another; it is this, that notwithstanding my Theory and Dissections had brought me to think *true Aneurisms* to be at least a very uncommon Disease, yet when I saw Mr. *Macgill* lay the tendinous *Aponeurosis* bare, I was ready to have renounced my Opinion, being perswaded it was the muscular Coat of the Artery, till he most dextrously prosecuted the *Aponeurosis* to its Rise from the *Biceps*, and so fully convinced me of the Mistake, into which I should most readily have been led without discovering it, if the Operation had been performed in the more speedy Way of laying the whole Tumor open by one Incision.



Ad vivum del. & sculp. R. Cooper





XVIII. *Histories of a Fever and of an Epilepsy*, by ANDREW ST. CLAIR, M. D. and Professor of Medicine in the University of Edinburgh.

AMONG the various Difficulties which attend the Practice of Physick, a considerable one arises from the Resemblance of Symptoms in Diseases of a different Nature. Hence it is that young Practitioners are commonly at a Loss what Method of Cure to follow, where the Appearances don't fully discover the Nature of the Distemper: For however carefully a young Physician, during the Course of his Studies, be warned not to expect that he shall find Diseases as distinct in Fact, as the Rules of Teaching require them to be explained, yet it is very natural for him at his first setting out in Practice, to judge of the Nature of the Disease by its first Appearances, and to settle the Method of Cure accordingly. It may therefore perhaps be of some Use to such, for whose Benefit Histories of particular Cases are chiefly intended, to communicate,

municate, as Occasion offers, Instances of such Cases as in the Issue were found to be different from what they appeared at first.

With this View I send you the two following Accounts, one of a *Fever*, the other of an *Epilepsy*, not indeed remarkable for any thing new or wonderful, far less for the Success which attended them. As they both proved fatal, I need not tell you, that neither Vanity nor Interest are the Motives which determined me to make them publick ; and I willingly leave it to proper Judges to decide, whether any thing has been omitted or misapplied in the Cure of either. If they contribute in any measure to prevent too hasty a Determination of the Nature of Diseases, and to engage young Practitioners to attend more to their Symptoms than their Name. in applying Remedies, I shall have my Wish.

A Boy, ten Years old, of a slender Habit of Body and delicate Constitution, about seven Years ago, was seized with the Small-pox of the confluent kind, and reduced to the greatest Extremity. During his Sickness, he was under the Care of a Physician of this Place, eminent for his extensive and successful Practice ; and at length was restored to Health again, tho' with the Loss of his left Eye, and Weakness

ness of the right, which ever after was subject to Inflammations from the smallest Accidents. He was afterwards attacked sometimes with a Looseness, attended with feverish Fits and Vomitings, which yielded to gentle Vomits and Purges of *Rhubarb*. He had recovered the last of these about four Days, when on the 13th of *October* 1732 he was taken with Weariness, Coldness and Shiverings, which were soon succeeded with burning dry Heat, and then with Sweating.

October 14. Next Day he was free of all Complaints, except unusual Weariness and want of Appetite.

15. The Day following, being called to him for the first time, I found him very feverish, and was told the cold Fit had returned three Hours sooner than two Days ago; he was free of Headach and Vomiting, his Eye slightly inflamed, his Tongue whitish, his Breathing somewhat oppressed with frequent Sighs, his Stools of a natural Consistence, and his Urine of a Straw-colour with a white Sediment. In the Evening, after bathing his Legs, he had a Sweat, and a restless Night; his Urine then was thick, with a Sediment as before.

16. He got a Vomit in the Morning, of the Infusion of *Ipecacuan*, *Scrup.* ii, which

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opera

operated only once, Part having been lost in pressing him to drink it. Through the Day he made no Water, was costive, drowsy, and inclined to rave, his Pulse soft, weak and scarce frequent. In the Evening he got a Turpentine Clyster, which procured him a plentiful Stool, and a large Discharge of Urine, with a lateritious Sediment. He was restless till four next Morning, then slept sound.

17. He continued to sleep all next Day, almost without Interruption till Evening, had frequent Grindings with his Teeth, no cold Fit, nor any thing like a new Paroxysm; his Pulse grew gradually more frequent through the Day, but continued soft, full and weak. His Back was blistered in the Evening, he drunk Emulsion, and had a restless Night.

18. Next Morning he was little sensible, but restless, his Pulse small and frequent, his Breathing free, his Tongue dry, his Urine thick, high-coloured, with a large brown Sediment. The *Cataplasmata Craton*. were applied to his Soles, and a Spoonful of the *Decoct. Serpentar. comp.* given every two Hours. At Noon the *Stupor* was less, his Pulse sometimes stronger, but variable, afterwards the Restlessness and Ravings increased till six of the Evening, when

when he fell into a sound Sleep. He had past no Urine for eighteen Hours, till now that he got a Milk Clyster, and urined plentifully, but had no Stool.

19. He tossed all Night, had a great Sweat on his Head, and frequently grinded his Teeth. In the Morning his Pulse was weak and quick, the *Stupor* much increased, and his Countenance ghastly; Blisters were immediately applied to his Arms and Ancles, Emulsion given for his ordinary Drink, and a Spoonful of the following Mixture every two Hours.

℞ *Decoct. Serpentar. comp. sine Mecon.*
Unc. iv. Sp. Salin. Aromat. Scrup ii.
M.

Through the Day his Pulse continued variable, sometimes weaker, sometimes stronger; the *Stupor* commonly abated upon taking the last Mixture, but soon increased again; his Head and Palms only sweated plentifully. In the Evening he past Water insensibly, and could swallow nothing but liquids. The Cataplasms at his Soles were renewed; he was more restless in the Night than before, shriek'd often, made Water insensibly, and the Sweating of his Head increased.

20. Towards Morning he got some Rest, and then the *Stupor* was much abated, his

Judgment less disturbed, his Tongue dry, of a deep red Colour, but not furred, his Pulse somewhat stronger; a large Discharge followed upon removing the Blisters, and the sweating of his Head was almost gone. Thus he continued till Evening, that his Pulse grew quicker and weaker, his Tongue moist; he became restless, pass'd Water insensibly, raved, shriek'd and toss'd till two in the Morning, then grew calm: At Night his Head was ordered to be blistered, but he was not able to bear having it. The Cataplasms were renewed at his Soles.

21. After a soft Sleep all the former Symptoms returned with more Violence, while his Pulse grew weaker; Blisters were applied in the Morning to his Thighs; the Emulsion and *Decoct. Serpentar.* continued as before. No Change happened through the Day. In the Evening he got a Clyster, which he could not retain, and late at Night was almost choaked with tough Defluxion in his Throat, which was brought up by the following Mixture.

R Gum. Ammon. Drach. sem. Solvatur in Aq. Still. Hyssop. Unc. ii. Acet. Scillit. Drach. i. M.

Of this he took thrice at an Hour's Distance, till he got free of the Defluxion.

22. Next Morning his Pulse was weaker
and

more frequent, a great Sweat on his Head and Hands, with a gentle Moisture over his Body, no Defluxion in his Throat; the rest as Yesterday. He got the following Powder in a Spoonful of Sack-whey at Noon, and had it repeated in the Evening; the Sweat however on his Body did not increase through the Day, and stopp'd altogether at Night.

℞ *Rad. Serpentar. virg. Gr. vii. Castor. Russ. gr. iii. Camphor. pur. Gr. i. M. f. Pulvis pro Dose.*

Assoon as the Sweat stopp'd, his Pulse became so weak and quick as scarce to be reckoned; he had frequent deep Sighs, tho' his Breathing was otherwise easy. About Midnight the Defluxion returned to his Throat, and at three of the Morning he died.

His Food, while he could take any thing solid, was chiefly Bread-berry, stoved Barley, and Bread soaked in Tea, or weak Sack-whey. His Drink (besides Emulsion) was Barley-water, Tea, and weak Sack-whey, by Turns.

A Child about four Years old, well made, nimble, and of a beautiful florid Complexion, towards the Beginning of last Winter was taken with an obstinate Cough,

Night-sweats, Waste of Flesh, and other bad Symptoms, which threatned a Decay ; but by due and timely Use of gentle Vomits, Balsamicks, Asses-milk, and Country Air, he seemed to recover perfect Health, notwithstanding an unfavourable Season : For his Appetite became good, his Digestion easy, no unnatural Thirst or Heat, no Cough, his Breathing free, his Sleep sound and calm, no Night-sweats ; nor was he soon fatigued at Play, but grew strong, and recruited Flesh daily, till he recovered his usual Habit of Body.

On the 25th of *January* 1733, he complained of a Pain at his Stomach, and Itching at his Nose ; he was restless in the Night, and his Sleep frequently interrupted by sudden Startings. Mr. *Macgill*, who had been so successful in relieving his former Complaints, gave him three Grains of *Mercur. dulc.* (the Boy being shy to take unpleasant Medicines) which procured him a loose Stool or two without any thing uncommon.

January 26. The Symptoms continued the same, together with a Disposition to rave. He got a Clyster that Day, which moved his Belly once.

27. He was brought to Town from the Country in the Neighbourhood. At three
After-

Afternoon I was called to him, and found him raving without Interruption, scratching his Nose, shrieking frequently; and was told, that when he slept, he wak'd suddenly with Startings, and cried out as if frightened. His Pulse was full strong and quite calm. He was immediately blooded at the Arm, and afterward got the following Powder, which was repeated at Night, and early next Morning.

℞ *Æthiop. miner. gr. v. Ent. Vener. gr. ii. M. f. pulvis pro dose. Fiant hujusmodi doses iii.*

In the Evening he got a Clyster, and had one Stool by it. He raved incessantly all Night, except in the Time of short Sleeps, which were disturbed as before with Startings and Shrieks. He scratched his Nose almost without Interruption, sleeping and waking.

28. In the Morning he knew no Body, his Pulse was quite calm, soft, and sufficiently strong. The former Dose of *Merc. dulc.* was repeated, and half an Ounce of *Tinct. of Rhubarb.* drunk above it. About Noon he was seized with an Epileptick Fit, which lasted ten Minutes, and was succeeded by a second about an Hour after. A Blister was immediately applied betwixt his Shoulders; he got Emulsion to drink,

and a spoonful of the following Mixture at the Approach of a Fit, or when it went off.
R. Aq. Still. Flor. Chamæm Unc. ii. Rut. Unc. i. Tinctur. Castor. Drach. sem. Sp. C. C. gutt. xv. Syrup. Caryoph. Unc. i. M.
 In the Evening having had no Stool all Day, he got a purgative Clyster, which moved his Belly once. He past this Night as the former.

29. About six in the Morning he had another Fit, which lasted longer than either of the former. The other Symptoms as Yesterday. The *Mercur. dulc.* with *Tincture of Rhubarb* was repeated, but no Stool following, the purging Clyster was given about one Afternoon, which was returned with very little Mixture of *Fæces*, and immediately after, sharp Cataplasms were applied to his Soles. In the Afternoon he became quite sensible, and continued so about two Hours. Towards Evening the Ravings returned; his Pulse continued soft and calm; Blisters were applied to his Ancles, and he got the following Draught.

R. Tinct. Rhei. simpl. Unc. sem. Syrup. de Rhamn. Drach. ii. M.

30. At four of the Morning he had another Fit still more severe, then a loose Stool, and slept after. His Pulse at nine was full,
 but

but languid and slower than that of a Man in Health. The last Purgative was repeated without any Effect. At Noon he seemed to be dying, but towards Evening his Pulse and Looks grew better. A Blister was ordered for his Head, but not applied; the Purgative was then renewed. In the Night the Fits returned, and continued with little Intermission. He had no Stool.

31. Next Morning the Fits continued, he got the following Mixture,
R Syr. de Rhamn. cath. Drach. ii. Tinct.
Jalapp. gutt. xv. M.

This procured him a loose Stool after Noon. In the Evening the Fits still continuing, his Neck and Body were much distorted; he had no Pulse, and died next Morning at seven.

During his Sickness he took sometimes a little light Spoon-meat, and drank Emulsion, Tea, and Barley Water.

Upon opening the Body next Day, we found the Bowels of the lower Belly all sound; the Stomach was almost empty, and though Mr. *Macgill* carefully slit open the Guts from one End to the other, there was not the least Appearance of Worms to be found, nor indeed of any thing else, except about two Ounces of a glairy Substance, of the Consistence of Jelly, near the

the Beginning of the *Jejunum*, and a small Quantity of soft *Fæces*, towards the lower End of the *Colon*; the Bile was somewhat thicker than natural, and of a dusky Colour. In the Breast nothing was faulty, but the Lungs, which adhered firmly on all Sides to the *Pleura*, and were full of Tubercles and suppurated Imposthumes of different Sizes; so that wherever they were cut, either thin *Pus* ran out, or a thick Substance of the Consistence of new Cheese was found within the Membranes of the Tubercles. The Blood-vessels of the Brain were all greatly distended with Blood, and in the Ventricles about six Ounces of Water were found: The Brain it self appeared quite sound.

Before I put an End to this Paper, allow me to observe, That tho' the first Case had almost all the Appearances of an Ague the first four Days, yet it proved a very different Disease, and required very different Management afterwards. In its Progress several of the Symptoms gave Ground to suspect Worms in the lower Belly, though none were voided, and there was no Opportunity of examining the dead Body; but the Violence of the Fever it self, and of the other Symptoms arising from it, was so great,

great, and of such Consequence, as to leave no Place for *Anthelmintick* Medicines. And here it deserves to be observed, that in almost all symptomatick Fevers, where the Symptoms are strong, and threaten immediate Danger, Regard must be had to these in the first Place, till their Violence abate, and allow Time and Opportunity to remove the particular Cause by proper Medicines. But on the contrary, where the Symptoms are not violent nor dangerous, the Original Cause ought to be first carried off, and then commonly the symptomatick Fever ceases, either of it self, or with very little Assistance.

'Tis remarkable in the second Case, that for some time before the Child's last sickning, he had all the Appearances of confirmed Health, although a sure and certain Cause of a *Phthisis Pulmonalis* was lodged in his Lungs; which undoubtedly would have proved fatal the Spring following: For neither the Tubercles nor Imposthumes could possibly have been formed during his last Illness, which scarce allowed Time for such a Progress, and showed not any one Symptom of either. Hence it appears how little secure the Event of phthifical Cases is, even after all Complaints cease, till the Patient has gone through all the different Changes

Changes of the Seasons, particularly Spring and Autumn.

Further, all the Symptoms of the Child's last Sickneſs ſeemed to point at Worms as the Cauſe of the Diſeaſe, inſomuch, that nothing was wanting to put the Matter beyond Doubt, except voiding them ; which however never happened, nor were there any found upon opening the Body. A Diſappointment of this kind is no new Thing ; for all experienced Phyſicians know, that every Symptom commonly produced by Worms (except that of voiding them) ſometimes ariſes from other Cauſes. It is therefore of Importance to obſerve, that the Method of Cure in theſe Caſes ought never to be confined to the *Vermifuga* alone ; theſe indeed are not to be omitted where the Circumſtances will admit of them, as in the preſent Caſe ; but at the ſame time, the chief Symptoms are to be treated as if they were independent of any ſuch Cauſe.



XIX. *Anomalous Appearances after an Ague: By ALEX^r. MONRO, Professor of Anatomy in the University of Edinburgh, and F. R. S.*

BY your allowing the Case I formerly extracted from the Records of the *Infirmary* here, a Place in your first Volume of *Medical Tracts*, I have Reason to think other Examples of Hospital Practice, if tolerably well chosen, will not be disagreeable to you. I have pick'd out the following History, because of its being so near of kin to the one I sent you last Year, both being the Effects of an ill managed Ague, with some anomalous Appearances common to them; but at last the Symptoms come out very different: And the Manner of their being carried off is singular in each, and uncommon in both.

Isabel Durie, of a low labouring Station of Life, was always irregular in her menstrual Evacuations, being sometimes obstructed for a whole Year together; and was frequently attacked with a vomiting of Blood, for which she had used a great
Vari-

Variety of Medicines ; but never was relieved till 1727, which was the thirty seventh Year of her Age, when she took some Purgatives, and had the bloody Vomiting only twice ever since. In November 1728, after a regular Course of the *Menses*, she was seized with a *Quotidian Ague*, which continued all the Winter, and wasted her Flesh and Strength greatly. Towards the Spring the Paroxysms became very irregular, both in their Time and Type ; she had a constant *Nausea* and want of Appetite, with Pains through all her Body. From the first Attack of the Ague her *Menstrua* ceased to flow ; nor had she any Appearance of them ever since that Time.

In the Summer of 1729 she used many common Cures for her Ague, such as Vinegar, the Roots of the *Bellis minor*, *Cortex Peruvian*, &c. with which she put it off for some little Time ; but always soon had irregular Returns.

In March 1730, instead of suffering the common cold and hot Fits, she was seized with a violent trembling, or rather shaking of her Arms, or of her Head, or of her Legs, or of all together ; which observed no certain Period of Time, either in their continuing or Intermission, but attacked her
three

three or four times one Day, then took the Form of *Quotidian*, and afterwards intermitted several Days, and soon again appeared in some of its former Shapes.

On Account of these anomalous Shakings and flying Pains in her Head, Neck, Breast and Belly, she was admitted into the *Infirmary* on the 15th *August* 1730. Her Pulse was then little altered from the ordinary healthy State, even in the Time of the Tremblings, which however were so violent, that a strong Man could not hold one of her Hands from shaking. Her Appetite and Digestion seemed to be good. Her Belly did its Office sufficiently. Her Urine was in large enough Quantity, and of a good Colour, without any lateritious Sediment. There were no preternatural Swellings to be observed any where in the Patient's Body.

When she was first taken in, her Disease seemed to yield considerably, and at last to be almost cured by the Use of *Mustard Vomits* (a), repeated every three or four Days,

(a) This being a little out of the common Road of Practice, would be the better to be a little explained. The Powder of Mustard Seed is made into the Consistence of a Loch, with warm Water, in which a little Sea Salt has been dissolved. Of this a common Spoonful, sometimes two, diluted in tepid Water, are given with an empty Stomach; and it operates well as an Emetic,

Days, and by taking two *Drachms* of crude *Sal Ammoniac* every Morning. But in the Beginning of *September* the Pain of her Stomach returned, and irregular Shakings soon succeeded; and did not yield to the former Medicines. She was therefore ordered frequent and large Doses of the *Stinking Gums*, *Galbanum* and *Asa fætida*, with *Sal. C. C.* and an aloetic Purgative was now and then given her: These at first relieved her, but soon lost their Effect, all the Symptoms returning with their former Violence. Her Vomits and Salt were again tried; which failing, she took the hotter *Alexipharmicks*, and these were succeeded by the strengthening Stomachicks: But though she acknowledged herself relieved always for a Day or two, on the Change of the Medicines, she was soon as bad as ever.

The Physicians and Surgeons being so often disappointed, and her Case appearing to prove a very tedious, if not incurable Disease, while Recommendations were presented for several other diseased People, who needed immediate Assistance, she was dismissed on the 8th *October*.

She lived at *Leith* after this, where she had

tick, and proves an excellent Remedy in most of the nervous Disorders. I have seen its good Effects in the Infirmary, and among my private Patients since I was taught it there.

had no Assistance, but sometimes came to Town here to ask my Advice ; by which I became acquainted with the Sequel of her History. Her Tremblings and Pains continued in the same way notwithstanding some nervous Medicines I gave her, till the Middle of *December*, when her right Arm swelled considerably at the Joint of the Elbow, with very racking Pain, and her Tremblings left her. By my Advice emollient Pultices of Bread and Milk, with some *Althea* Ointment, were applied ; they relieved her somewhat of the Pain, but the Swelling of the Joint increased, and a slow Suppuration at last came on in *April* following. When the Abscess was opened a little below the *Olecranium*, a considerable Quantity of watery *Pus* was evacuated, and she had some Dressings delivered her ; but having no skilful Hand to apply them, and not being in Condition to come frequently to Town, her Sore degenerated into two fistulous Ulcers, which continue still to discharge a small Quantity of a thin *Ichor* : Her Fore-arm is bended and rigid, with little or no Motion in the Elbow. But she has been all this Time free from the bloody Vomitings, flying Pains, Tremblings, and all other Complaints, except the Trouble of her Arm.

U

This

This Woman's Disease went off in but a very indifferent Manner, she having lost almost the whole Use of one Arm ; yet it is the most favourable Case of that kind, that I have either seen, or heard of among my Acquaintances ; for no other, of several whom I could name, under those irregular Shakings, after an ill managed Ague, have at all recovered. I saw one who has suffered a tedious continued Fever, with the Advantage of only a few Weeks Remission from Shaking.



XX. *Uncommon Hæmorrhagies for twenty nine Years: By Mr. PATRICK MURRAY Surgeon at Earlston.*

ISABEL ROBERTSON living in the Village of *Earlston*, now aged forty four Years, after having had her *Menstrua* twice at fifteen Years of Age, was thrown violently on a Stone, while the third Course of that natural Evacuation was on her ; her left Shoulder was much hurt by the Fall, and she soon vomited a great deal of Blood. Her *Menstrua* left her before next Morn-

Morning, and she had violent Pain in the left Shoulder and Side, with great Faintness and Sickness, vomiting Blood, and voiding it at the Nose every now and then; which she continued to do every Day to the Quantity of about half a Pound for two Years thereafter, the *Hæmorrhagy* observing no particular Time or Period, but returning four, five, six or seven Times in a Day: And sometimes the Blood came not only by the Nose and Mouth, but also by the Ears; and some Appearance of *Menstrua* returned every fourth Night. During the four succeeding Years she bled at Mouth, Nose, Ears, Eyes and *Uterus*, having but short Intermissions; only that by the *Uterus* was sometimes stopped for seven or eleven Weeks, which she attributes to the astringent Medicines which she got in great Quantity.

In the sixth Year of her Disease cupping Glasses were applied to her Back, and stopp'd the Bloodings for seven Weeks; but this occasioned a most violent Pain in her Breast, which swelled so much, that it was obliged to be scarified a little below the *Cartilago Ensiformis*.

In the eighth Year she was greatly troubled with a Suppression of Urine for eight or ten Days, of which she was at last relieved,

ved, by applying two living Toads to her Kidneys ; what she then passed was rather like Blood than Urine.

In the twelfth Year her Bloodings were not so frequent, they returning sometimes every fifteen or twenty Days, and at most twice a Week ; in which Way it has continued these seventeen Years more, only that within these two Years past she not only bloods at Mouth, Nose, Ears and Eyes, and passes it by Stool, but I have seen it coming out from her Breasts, and from the Roots of the Nails of both Fingers and Toes.

This poor Woman has always lived on the lowest vegetable Food, being born of mean Parents, and being sustained these Years bygone by the Church-box ; nor was she ever sensible, that any little Change of Diet that she has had, either made her Bloodings more or less frequent, or in greater or less Quantity. She is sensible of little or no Pain before the Bloodings come on, but knows their Approach, by a Stiffness in the Finger and Toe Points, and by her becoming dull of Hearing. She is sensible when the East-wind blows, for then she is chill and cold, and it brings on the *Hæmorrhagy*, especially at the Nose and Mouth. After each *Hæmorrhagy* she
is

1
s faint and sick for some Days. During the first twenty Years of her *Hæmorrhagies*, she was able in their Intervals to walk thro' the Town; but since that she is for most part confined to her Bed, and is very wan-coloured, feeble and weak, but has her Judgment and Memory still intire.

In the first Years of her Illness she got a great Variety of Medicines, from none of which she found any Change, unless that she thought the *Tinctura Antiphthisica* made her Blood thicker, though it did not prevent the *Hæmorrhagy*.

For several Years she was let Blood of at either Arm or Ankle, and sometimes at both, every eight or ten Days, and frequently oftner. Now she is blooded every Fortnight or three Weeks. She could not observe that opening a Vein, when she let to the Quantity of fourteen Ounces, immediately before she expected the *Hæmorrhagy*, ever prevented it, or that *Venæsection* ever stopped it; but they make it more moderate, which has induced her to continue this twenty nine Years in the Use of it.

All the Times that I have let Blood of her, it is no higher coloured, or of thicker Consistence than Water in which Flesh has been washed; and what I have seen her e-

vacuate in the *Hæmorrhagies* is of the same Nature: And she tells me it has not been thicker these many Years past.

Any of you, Gentlemen, who happen to come to this Part of the Country, may satisfy your selves of the Truth of what I have told, for she is very fond of relating her History; in the mean time, allow me to appeal to Mr. *Monro* Professor of Anatomy at *Edinburgh*, as a Voucher whom you certainly know and will credit, who has seen her several Times, examined herself and Neighbours concerning her Case, and desired me to draw up this Account.



XXI. *The Dura Mater ossified, and other morbid Appearances observed.* By Mr. JOHN PAISLEY Surgeon in Glasgow.

IN a Man whom I dissected, *February* 1732, I found the *Omentum* very much emaciated, consisting only of the Membranes and Vessels.

The *Vesicula fellis* was enlarged as big as both my Fists; and from all the Trials I could make, the *Ductus cysticus* seemed entirely collapsed; I could easily pass a Probe

Probe from the *Duodenum*, through the *Ductus communis cholidochus*, but not into the *cystick* Duct; neither could I squeeze one Drop of the Bile from the *Cystis* to the Gut. These Trials confirmed me in the Opinion, that that Duct was grown together, and hindred me from trying it by Injection, which ought likewise to have been done, to put it past Dispute. Upon opening the *Vesica*, I found that it contained a great Quantity of a dusky colour'd Bile, with many small black stony Concretions, tho' none of them were in the Duct; nor could I then distinguish the Place where the Duct made its Exit from the *Cystis*. The Liver was a little schirrous, and of a considerable Bigness.

The Spleen was likewise very large, and adhered so firmly to the Diaphragm, that it could not be separated from it, without a considerable Force.

The Heart was very large and flaccid; the left Ventricle considerably larger than the Right, and its Sides at least as thin; The Reason of which I could not so well understand or explain, unless it were owing to a small Hole observable in two of the semilunar Valves in the Mouth of the *Aorta* so big, as easily to allow a large Probe or small Crow Quill to

pass them, by which in the Contractions of the *Aorta*, when these Valves were thrust back, some of the Blood might regurgitate into the Ventricle. The upper *Limbus* of one of the Valves was cartilaginous; in another there was a small cartilaginous Substance about the Bigness of a *Coriander Seed*, not perfectly spherical, but a little angular.

After removing the *Cranium*, and cutting up the *Dura mater* upon each Side of the *Falx*, in order to take out the Brain, I found some hard Bodies in the *Falx*, which I thought at first were some stony Concretions; but upon Examination found they were Bones. On the right Side there were four of them, of the same Dimensions and Figures, as in the annexed *Tab. III. Fig. I.* E E E stretching out sharp pointed *Striæ* every Way, a small Part of the three anterior, which are the largest, being formed in the *Falx*, the rest of them in the *Dura mater* of that Side, D D D, which in the Figure appears folded up, to be in a Plain with the *Falx*. There was no Appearance of any of these Bones upon the external Side of the *Dura mater*.

A little farther forward in the *Falx*, near its anterior Part, was a large Bone, more than an Inch and a half in length, and a large half

half Inch in Breadth, very protuberant on the right Side, and angular at M, with sharp pointed *Striæ* all round, especially at its anterior Part. This appeared likewise on the other Side of the *Falx*, but not half so large; the whole of that Membrane on the left Side not being ossified, opposite to the Bone, but only the Part F, as in *Fig. 2.* It was not protuberant on this Side, but rather a little hollowed. On this left Side appeared another Bone K, distinct from these on the Right, and lying in the same Manner in the *Falx* and *Dura mater*.

A little further foreward, near the Attachment of the *Falx* to the *Crista Galli*, is another small Bone G, equally conspicuous on both Sides.

Though I could not procure such a distinct Account of this Man's Life and Malady as might be necessary to illustrate the foregoing History, I have sent it to you, Gentlemen, that if you think the Communicating thereof to the World may be of any Use, you may do it; if you don't think it proper to give it a Place in your Collection, you may throw it aside.

Scribere te nobis, tibi nos accredere par est.

Hor.

All

All I have heard with respect to him, was, That he had been a Soldier, was many Years Abroad, but has been in this Country again more than twenty Years, did not complain much of Headachs, was no great drinker, neither was much indisposed, till about six Weeks before his Death, that he took a Fever, and after it a Jaundice, of which he died.

The Figures are drawn very exactly from the dried *Falx* (which I have still by me) by Mr. *William Robertson* Limner.

T A B. III. Fig. I.

A A A A. The *Sinus longitudinalis superior*.

B B B B, The *Sinus longitudinalis inferior*.

C, The fourth *Sinus* of the *Dura mater*.

DDD, Part of the *Dura mater* of the right Side turned up, so as to be in a Plain with the *Falx*, that the four following Bones may be seen.

E E E E, Four small Bones, the three anterior being the largest.

F, The large Bone in the *Falx*, very protuberant and angular at *M*, being more than half an Inch thick at this Part.

G, Ano-

G, Another small Bone equally conspicuous on both Sides.

H. The second Process of the *Dura mater*.

L. The Anterior Part of the *Falx*, where it takes its Rise from the *Crista galli*.

Fig. 2.

A A A, The *Sinus longitudinalis superior*.

B B B, The *Sinus longitudinalis inferior*.

C, The fourth *Sinus* of the *Dura mater*.

DD, Part of the *Dura mater* of the left Side turned up that the following Bone may be seen.

K, A small Bone on the left Side.

F, The Appearance of the large Bone in the left Side of the *Falx*.

G, The small Bone in the *Falx* equally visible on both Sides.

H, The second Process of the *Dura mater*.

L. The anterior Point of the *Falx*.



XXII. *A Consumption and Dropsy of the Breast, from a Wound too hastily closed.*
By Dr. GILBERT WAUGH Physician
at Kirkleatham in Yorkshire,

ARTHUR CAYLEY, a young Gentleman about fifteen Years of Age, was of a weakly Constitution, a bilious Temperament and frequently subject to the Jaundice.

It happened unluckily, about three Months before his Death, as he was running to School, with a Penknife in his Hand, that he fell, and thereby received a Wound about an Inch below the Nipple of his right Breast; thence issued a small Quantity of Blood before the Surgeon came, who judging the Wound altogether superficial, did without Hesitation heal it up, tho' the Symptoms plainly indicated that the Hurt was deeper; for the Patient incessantly complained less or more of a Pain in his Breast, which was sometimes so violent, that he could neither laugh nor cough without Torture; nor could he inspire fully,

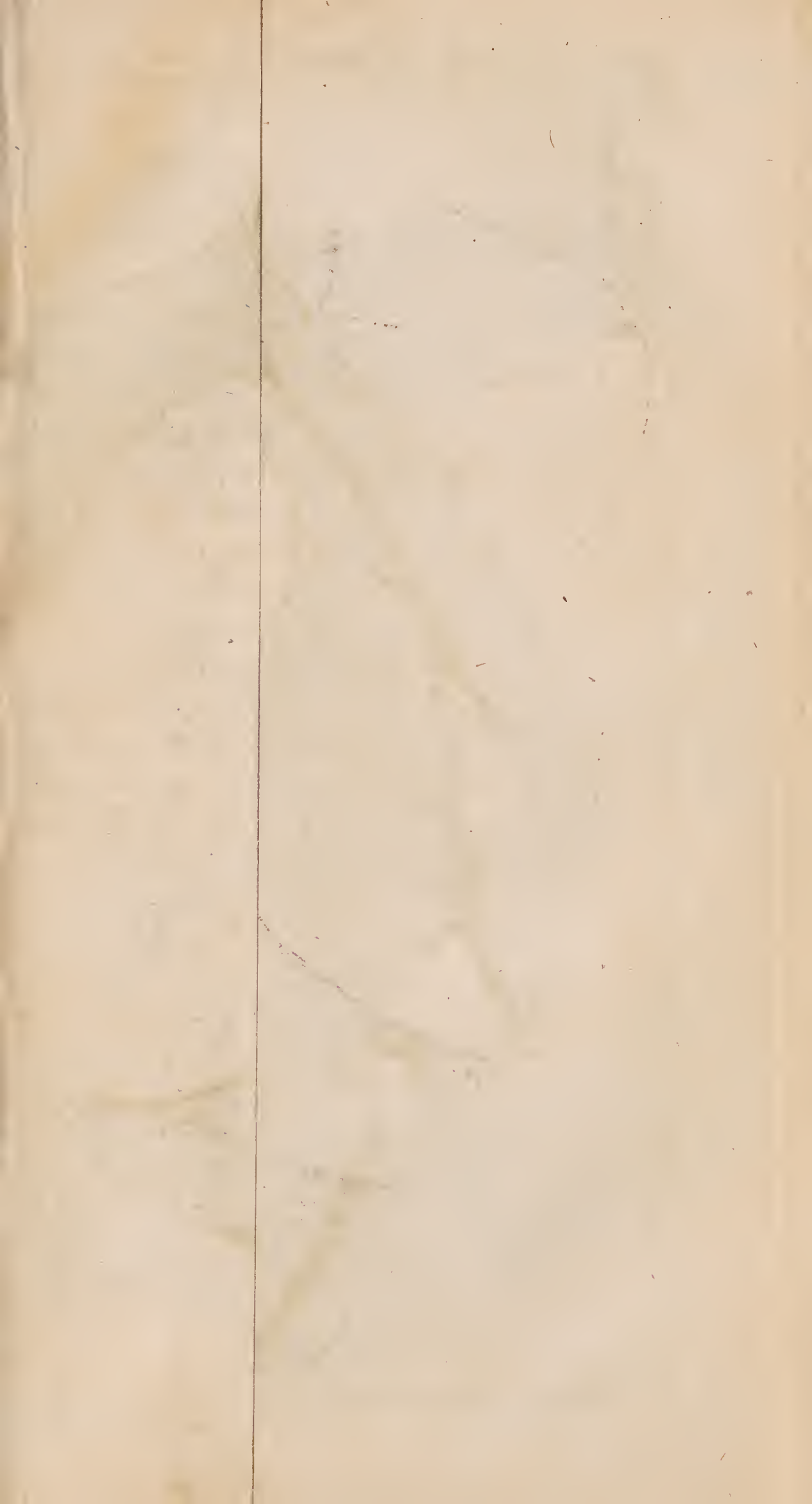
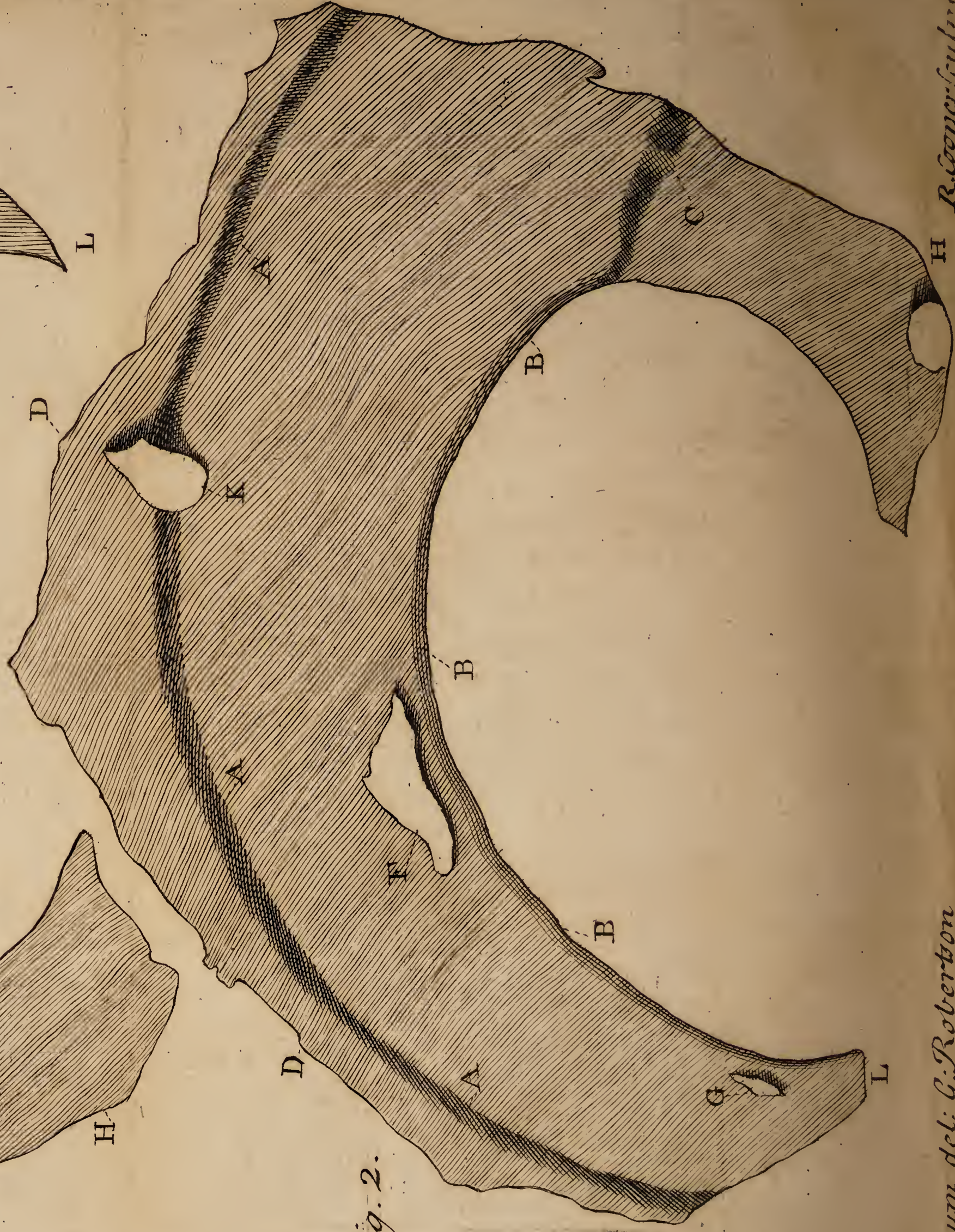


Fig. 1.



Fig. 2.



fully, without the greatest Uneasiness; so that his Neighbours judged him in a lingering Condition; and with Pity observed him going off by a gradual Consumption, without a violent Cough or purulent Spitting. The Symptoms of his Disease were, perhaps, more gentle, that he naturally loved, and always used a Milk Diet.

I was called only four Days before his Death; at which Time he complained constantly of an acute Pain in his left Side, about the Situation of the *Diaphragm*, and of an unsupportable Anxiety and Difficulty of Breathing, an intense Heat within his Breast, an unquenchable Thirst, and excessive Coldness of the extreme Parts; his Eyes were dim and cloudy, as in the last Struggles, his Urine variable, sometimes letting fall a light slimy Sediment, but for the most part pale, with none; his Pulse weak, slow, and sometimes intermitting: He had a Tension of the *Hypochondria*, and Stomach, and cold Sweats about his Head and Breast; all which seemed to intimate Death inevitable. However, that I might in some Measure answer the Importunity of my Patient's Mother, I was obliged to prescribe, though with small Hopes of Success. The present Situation of Affairs absolutely forbad Bleeding, and there

was scarce any other Mean left, but to attempt to give him some small Relief by a pectoral Decoction for Drink, the Inspiration of the Fumes of the same made warm, and mixed with Vinegar and some other pectoral Medicines usually prescribed in such Cases. Vesicatory Plaisters were likewise applied to the Extremities. In a few Hours his Cough (which before had given little Trouble) growing more frequent, flattered us with Hopes of a succeeding Expectoration; but they were found groundless: The Pain in his Side also apparently yielded to a Fomentation; but the other Symptoms not only remained, but increased, till Death put a Period to them all.

Having obtained Liberty to open the Body, I observed the Skin on the left Side appeared blotted, and discoloured in a very singular Manner. The Teguments of the Breast being laid aside, the first Thing that struck my Eye, was the callous Vestige of the Wound, clearly demonstrating the Progress of the Knife into the Cavity of the *Thorax*. Having then raised the *Sternum*, I found that the *Pleura* on the right Side was much thicker than natural, and in some Places almost cartilaginous, strictly adhering to the Ribs. I found also at the Vestige of the Wound, a remarkable Cohesi-

on

on of the Lungs to the *Pleura*. Having separated the right Lobe of the Lungs, there appeared at the Part adhering to the *Pleura*, a hard scirrhus Lump almost as big as a Walnut, under which I discovered a large Collection of *Pus*, which had also made its Way into the other Lobe of the Lungs.

In the left Side of the *Thorax* was contained Water to the Quantity of eight Pounds, in which did subside a thick white Water, not unlike half-melted Suet.

Having removed the Water, I found the left Lobe of the Lungs not the Bigness of my Fist, and no way resembling the Substance or Figure of Lungs, but a putrid Lump. The *Pleura* on this Side was quite wasted.

The *Heart*, with its Vessels, was very small, void of Blood, on all Sides firmly attached to the *Pericardium*.

The Colour of the *Liver* was good, but its Substance somewhat harder, and the Size larger than natural.

The *Gall-bladder* was turgid with Bile, whose Colour was not a laudable yellow, but much inclined to black.



XXIII. *An Asthma accompanied with Palpitation and flying Pains of the Breast and Shoulder: By Dr. ROBERT LOWIS, Fellow of the College of Physicians at Edinburgh.*

A Healthy Boy, about four or five Years of Age, after playing among wet Grass, was suddenly seized in the Night with a Suffocation; of which he was immediately relieved, by a plentiful Blood-letting at the Arm: But ever after was observed, when speaking much, or at his Diversions, not to have so free and long Breathing as usual.

In November 1721, being then about Eleven Years of Age, he was affected with a Pain of his right Shoulder and Breast, which gave him great Uneasiness in Breathing; his Pulse at first differed not much from what it used to be in Health, but in the Progress of his Disease became feeble, frequent and unequal. He had some Cough, but not very troublesome; his Appetite for Food was little, and his Thirst moderate: His Urine was generally in small Quantity,

ty, of a reddish Colour ; and when it did separate, let fall a copious brown Ground. Towards the End of his Illness, he had a Pulsation at the Pit of his Stomach, but not so considerable as in the two following Returns of it. He had a Swelling of the Testicles and *Scrotum*, and of his Legs chiefly towards Evening ; at which Time also his Pains were most violent, and often obliged him to ly upon his Elbows and Knees, in which Posture he always found most Ease.

The Remedies used were repeated Blood-lettings, to the Amount of forty Ounces, in less than three Weeks, by each of which he was sensibly relieved, but the Pains always returned in three, four or five Days ; all his Blood was fizy : He took several Vomits and Purges, Infusion of Stone-Horse Dung, *Sperma Cetæ*, with volatile Salts, Expression of Hoglice, and other Medicines, to the same Intention. He had also externally spirituous Liniments. And last of all, his Pains still returning, he took forty or fifty Grains of *Sweet Mercury* in small Doses ; which, without Salivation, Soreness of Mouth, or any considerable Evacuation, freed him of his Pains and other Symptoms, after six or seven Weeks Illness.

In *June* 1723 he had a second Return; only in this the Symptoms were more uneasy: Blood-lettings had no better Effect than before, and for that Reason were not so often repeated: Mercury given as formerly had not like Success: Tepid Baths, with cupping and scarifying where the Pain was most afflicting gave some Relief, the Pain and other Symptoms yielded gradually, and the Season of the Year favouring, by the Help of Asses Milk and moderate Exercise on Horseback, after two Months Illness, he recovered.

The third and last Return was about the Beginning of *September* 1724: The Symptoms were still worse than in the former; Blood-letting three or four times repeated gave but short Relief, Mercury none at all; the Pulsation at the Pit of the Stomach became much more observable; there was a considerable Tension in the Region of the Stomach and right Hypochonder. About a Week before his Death, he complained of a slight dull Pain in these Parts, but had no Vomiting, nor Signs of greater Fever than before; his Legs swelled to a vast Bigness, his Face also swelled, but the rest of his Body was much emaciated; his Breathing was very laborious, with a short Cough, and little Expectoration. What he did spit
up

up with much Trouble, as he drew near his End, seemed to be a brownish *Pus*, mixed with a little Blood. With these Symptoms his Pains continuing, made his former Posture of lying upon Elbows and Knees afford him little Relief; the most he had was standing with his Arms leaning upon the Back of a Chair, or sitting with his Breast and Arms leaning forward upon Pillows laid on a Table. And in this Posture he died *October* 18th.

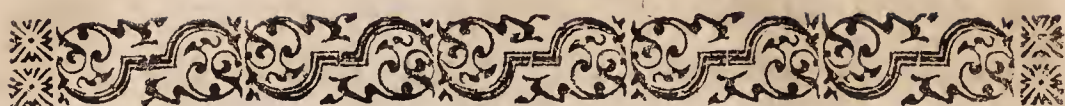
Upon the 20th his Body was opened.

1. In the lower Belly the Stomach was found much distended, and upon the Bottom of it towards the left Side there was a Mortification about the Breadth of the Palm of a Man's Hand.

2. The Liver was very large, but otherwise found.

3. In the *Thorax* the Lungs were attached to the *Pleura* in two or three Places, otherwise pretty found.

4. The whole Surface of the Heart was as closely united to the *Pericardium* as to its own proper Membrane, and each of its Ventricles was capable of containing a Gill of Liquor.



XXIV. *A Tumor in the Oesophagus, hindering Deglutition almost entirely.* By Dr. FRANCIS PRINGLE, late President of the College of Physicians at Edinburgh.

IN the Year 1712, a Gentleman of a robust healthy Constitution, and in the Flower of his Age, after hard drinking especially of Spirits, was seized in the Month of *May*, with a throwing up of every thing he eat or drank, and that without Pain, violent Reachings to vomite, previous Sickness or *Nausea*; but the Moment he swallowed Meat or Drink, almost before it entered the Stomach, it was returned again, as if he had spit it out of his Mouth only. This Symptom, however slight and inconsiderable it appeared at first in one of his Age and Strength, eluded the Force of a great Variety of Medicines; Vomites, Stomachick Purgatives, Bitters and Strengtheners, *Chalybeates*, Mineral Waters, Asses Milk, testaceous Powders, &c. were all prescribed in their Turns, to no Purpose. The Disease still continuing obstinate, began soon to be attended with a daily and gradual

gradual Decay of Strength and Flesh, and a constant Chillness, even during the Summer Season, till at last he was brought into a perfect *Marasmus* and *Atrophy*, in which Condition he died in *October* following, never having any other Symptom than those mentioned.

His Body being opened, there was a hard glandular Excrecence found in the Cavity of the *Oesophagus*, continued from the middle of this Canal to the upper Orifice of the Stomach, filling the whole Cavity so much, that a Probe cou'd scarce be thrust down to the Stomach.

XXV. *Difficulty of swallowing, Loss of Appetite, &c. from schirrous Tumors in the Oesophagus and Stomach. By Dr. JOHN TAYLOR, Fellow of the College of Physicians at Edinburgh.*

————— Aged thirty four, of a slender Habit, but of a very healthy Constitution, complained, for almost a Year, of a Pain frequently attacking him under the *Xiphoid* Cartilage, without using any Medicine: After this, upon getting for some Time his Diet very irregularly, he lost his Ap-

petite and Digestion; for which he was advised to try Steel, Ginger, and Pepper mixed; Having continued the Use of this Powder three or four Weeks without any Benefit; but, on the contrary, his Symptoms growing every way worse, and his Body wasting considerably, he asked my Advice, about the End of *November* last. His Complaints then were a Decay of Flesh, Strength and Colour, a great Difficulty for most part in swallowing any solid Food, which after passing easily enough to near the Mouth of the Stomach, met there with great Resistance, being sensibly compressed, and occasioning much Pain before it got further down; and frequently the descending *Bolus* was violently squeezed back into the *Fauces* from this Part, while sometimes, though seldom it could get without any Impediment into the Stomach, whence he commonly was soon obliged to spout up again his Victuals, with a great deal of Phlegm. He had however little or no Trouble in swallowing or retaining Liquids or thin Food, provided he swallowed them slowly. He also complained much of a constant girding across the lower Part of the *Epigastrick* Region. He never had been sensible of his receiving any Hurt, neither was there any external Pain or Tumor felt; his

his Pulse was full and good; he slept well; had no Thirst nor Sweats; his Urine was in a natural enough Quantity, but crude; he was generally costive, and much troubled with Belching and *Borborygmi*.

I flattered my self that his Symptoms were mostly nervous; and therefore resolved to cleanse the *primæ viæ* first; and then to prescribe him corroborant Medicines, with some of the milder Antihystericks.

Doses of *Ipecacuan* in Substance and Infusion, though larger than ordinary, and assisted by *Carduus* Tea for Drink, had no Effect on him: But the *Tinctura sacra* and *Rhubarb. composit.* answered very well as Purgatives; and he got Pills composed of the softer Gums, *Rhubarb* and *Extract. Fl. Chamæmeli*, in a few Spoonfuls of an Antihysterick Julep; by the Use of which, with gentle bitter Stomachic Infusions, an easy nourishing Diet, and proper Exercise, his Appetite and Digestion became better in a few Days; I added soon a little Soap to the Pills, and some compound Stomachic Waters to the Julep; and in some Time after, I mixed Steel with the former, and dissolved a little *Asa fætida* in the latter, and applied the Antihysterick Plaister to the Epigastric Region; by which Means he recovered his Appetite, Flesh, Strength and

Colour, and his Girding became easier; but still the Complaints in swallowing remained, as well as the spouting up his Food, with great Quantities of Phlegm: To remove this I gave him *Oxymel Scillitic.* and afterwards *Vini Emet. drach. x.* but could procure only some weak Attempts to vomit, which brought up nothing.

Towards the End of *December* he was violently seized with a *Nephritis* in both Kidneys, attended with a total Suppression of Urine; which kept him five Days in a very miserable Condition, notwithstanding all the ordinary Evacuations, Bathings, Diureticks, &c. proper in that Disease, till at last he passed a Stone that had come down from the right Kidney: But this Shock left him much weaker, and made all the Complaints of his Appetite, Deglutition and Digestion worse than ever, so that he could bear no solid Food, and his Medicines were all thrown back, except a medicated Ale, in which bitter Stomachic and diuretick Materials had been infused.

Upon my desiring Assistance, Dr. *Francis Pringle*, late President of our College, was consulted. We ordered some *Fl. Sulphuris* to be taken in Milk every Morning, and renewed the gummous Pils, with Soap and *Balsam. Peruvian*; which he continu-

tinued to use till the beginning of *February*, without any Relief; about which Time the Patient observed, that if he eat Bread with any Liquors, he was sure to throw all up; which did not happen, if he first eat the Bread and some while after drank the Liquors.

Next, we prescribed Riding, *Æthiops Mineral*, and a Decoction of the *Pareira Brava*, with some *Tinctura Martis in Vino Rhenano*, which he took a considerable Time to no Purpose, his Symptoms turning worse, his Body wasting apace, and his Pulse becoming quicker.

About the Middle of *March* he began to have Morning Sweats, without any Cough or gross Spitting; soon after which, as he was walking in the Fields he brought up two *polypous*-like Substances, in the same Way as he used to do his Food; one of these was of a firmer Consistence than the other, but was pretty much putrified at its Extremities. They both resembled a *Pistachio* Nut in Figure and Bulk, only they were about a third longer. Immediately upon their coming away, he felt a sharp Pain in his Breast, which continued constant four Days, he taking in the mean time *Aq. Calcis* in Milk, and a mild healing Electuary. In a Fortnight after he brought up a third Substance, like the two former, but

but without feeling any Pain at the time or after ; neither did he evacuate any thing bloody by the Mouth or by Stool at either Time. After the coming away of this third Body he had no more Night Sweats.

We then forbore giving Medicines, and only recommended a Milk Diet and moderate Exercise.

After the Middle of *April* he found Veal, young Pigeons, and such like, do much better with him than the thin Food which he could only bear formerly.

In the Beginning of *May* he underwent a gentle short Fit, of the *Nephritis* in the right Kidney, and then began to be sensible of a Hardness in the left *Hypochondre*, which he always complained of from that Time. Soon after this a *Diarrhæa*, with whitish coloured Stools, came on ; we could not stop it, and he decayed fast : So that he died before the Middle of *June* greatly emaciated, but perfectly distinct in his Senses and Judgment,

His Body was opened at my Desire, in Presence of Mr. *Monro* Professor of Anatomy, by Mr. *George Young* Surgeon Apothecary, who had attended him during all his Sickness.

Upon cutting the Teguments of the *Abdomen*, the lower Edge of the *Omentum*,
which

which was very short, was seen grown to the *Peritoneum* from one Side to the other of the lower Part of the *Epigastrick Region*. The *Omentum* was thin, but hard and firm, at the Place of this Attachment; which being cut, and the Teguments laid back, it was likewise seen adhering to the Intestines in several Parts, being every where schirrous and vastly thick where it adhered to the Liver, Spleen and Stomach, the two former being firmly connected to the last by it. In cutting away the *Omentum* from the other Bowels, we discovered a great many little Abscesses in its Substance. The Surface of the Liver, Spleen and Stomach had small white Tubercles scattered over them, excepting which, so much of the Stomach as was then in Sight appeared natural enough, only its *Dorsum* adhered every where very firmly to the *Diaphragm*, by means of a hard steatomatous or schirrous Substance like to that of the *Omentum*.

The Intestines seemed a little inflamed in some Places, and were grown more than usual to the *Peritonæum*.

The Kidneys and *Vesica Urinaria* contained no Stone, contrary to what we expected.

All

All the other *Viscera* of the *Abdomen* were found.

When the *Thorax* was laid open, we took some bloody Water out of each Cavity. The Lungs appeared sound, only the inferior Lobe of the left Side adhered firmly to the *Diaphragm*, where, when we were separating it, we discovered an Abscess containing some *Pus* and a viscous brown Fluid, exactly like to what was found in the Stomach afterwards. The Cavity in the Lungs was not larger than to receive two Ounces of Liquor, but from that the Abscess penetrated through the *Diaphragm* and Coats of the contiguous Stomach into its Cavity, the Perforation in the *Diaphragm* and Stomach being large enough to allow one's Thumb to pass.

The *Oesophagus* was found till within two Inches of the *Diaphragm*, where it degenerated into a white thick scirrhous Substance, in which there were a great many small Suppurations, each of which opened into this Canal. The superior Orifice and Substance of the Stomach for some Inches below were much in the same Condition; so that the *Par vagum* being here compressed, this Bowel might probably have been rendered so insensible, as not to be moved
by

by the strong Emeticks which had been given him.

The Glands at the Divisions of the *Trachea Arteria* were infarcted with a spongy stony Substance, inclosed in a very firm black Membrane.

All the other Parts were in a natural State.

 * * * * *

XXVI. *An Account of an extraordinary Worm; by Mr. JOHN PAISLEY Surgeon in Glasgow.*

IN February last a young Man was wounded in a Duell with a small Sword, which entred about four Inches below the right Nipple, and a little towards the Back; by probing the Wound, we found it reached four Inches slanting downwards, betwixt the Teguments and the Ribs, without any Signs of its penetrating, though all the different ways to discover it were tried, as probing, Injection, &c. He told us he was in his utmost *Longe*, when he got the Wound, and ran upon his Antagonist's Sword, who having both a much longer Arm and Sword than he, and being taller,

taller, had dropped the Point of it a little, otherwise it was not possible to see how he could have got such a Wound. He lost a considerable Quantity of Blood, by which after he had walked off the Field for a considerable Way, he turned faintish; when he held his Hand upon the Wound, he could easily stop the Bleeding; but the Pain soon obliging him to take it off, the Blood gushed out for a little briskly, then ran trickling down as from any such small Wound in the Teguments. When he fainted, it was upon a Stair-case early in the Morning, where he lay above an Hour, with nothing upon him but his Shirt and riding Coat. At first the Wound was dressed with dry Dressings, the Blood easily stopt; and by a gradual Compress, and the scapulary and Napkin, it was bandaged up. In two or three Days, the Suppuration succeeding well, it healed up in eight or ten more.

The third Day at Night after he had received the Wound, he complained of a violent Pain in the Region of the Stomach, and in the Back opposite to it; but none near any Part where the Wound was, and had some Reachings to Vomit; upon which I was afraid lest the Sword should have slipped through below one of the Ribs, and
pierced

pierced through the *Diaphragm*, and touched the Liver, though he had none of the other Signs of these Parts being wounded. He was confined to a low Diet from the Beginning, and having a great Cough before he was wounded, which no Doubt was increased by his lying so long on a Cold Stair almost naked; he was ordered proper *Linfuses*, *Apozems*, &c. by Dr. *Brisbane*, who was the Physician that attended him, and an Anodyne Draught at Bed-time; his Pulse was a little quick the first three Days, but on the fourth the Pain in his Back was entirely gone, as was the Fever, and the Pain in the Stomach much abated: He complained of no Drouth, nor of any other Uneasiness, but of the Cough, and the Pain in his Stomach, which recurred frequently in the Night Time, and especially towards the Morning. About the fourteenth Day from his receiving the Wound, he was attacked with some aguish Fits, and profuse Sweatings, without any regular Appearance; so that it could not be reduced to any kind of intermitting Fever; and sometimes was thrown into strong convulsive Fits, tho' he said he never had had any such all his Life before.

About the 15th of *March* all terminated in a Jaundice, for which the Physician ordered

dered proper Medicines, by which it went off in ten Days, when he recovered his Colour again, and did not complain so much of the Pain in his Stomach; he had got little or no Passage by Stool from the Time he first complained, without the Help of Clysters; but on the 24th of *March*, he took a kind of Looseness, and passed a great Quantity of *Fæces*, which looked like boiled Blood, and some pure Blood, complaining much of the Pain in his Stomach.

On the 26th he passed a large Worm, a Foot and a half long, and an Inch and a half Diameter, when the Draught of it, which I send you along with this, was taken by Mr. *Robertson* the Limner, before several of the Masters of the University. It had been considerably larger at first; but so soon as he had passed it (which he could not do till one in whose House he staid, pulled it from him) he was so much surpris'd at it, and afraid that it had been one of his Intestines, that he said he cut off about an Inch of its Tail, and gashed it in one or two Places with a Knife, to see what was in it, by which a great deal of Blood ran from it; as there did also after it had been washed six or seven Times in Water. He lost a great deal of Blood along with it, to
Ap-

Appearance some Pounds, and for several Days passed some grumous Blood.

The Worm was dead when he passed it, and made up of a great many Rings like the Earth-worm; the Interstices between each Joint was rather larger than as they appear in the Figure, and were of a dark Chocolate Colour; the Joints themselves more pale, or rather of a livid Flesh-colour: The Head was considerably smaller than the Body, though made up of Joints, and very much resembled a Duck's Bill. It was flatter on the under-side, with a kind of Band, running all along from the Neck, which joined the Head and Body together to the Tail, into which all the Rings and Joints seemed to terminate, resembling pretty much the one that runs along the upper Side of the *Colon*. It had a triangular Mouth, like the Horse-leech. After he passed it, he staid in this Place till the 26th of *April*, when he ventured on a Journey to *Aire*, and grew gradually better, though frequently complaining of Pains in the Region of the Stomach all the Time. From *Aire* he writes he has passed another, rather larger than the first, but it came away all in Pieces.

I have no Author who gives an Account of any such Worm, only Dr. *Daniel Clerc*

in his *Historia Latorum Lumbricorum*, cap. xiii. (a), that Section where he treats of the *Res inanimatæ vermibus similes*, reprehends Maroja, Physician to the King of Spain, for relating the History of such an one, His Words are, *Verum crassius etiam allucinatus est Cyprianus Maroja, Philippi quarti Hispaniarum regis medicus, cujus hæc sunt verba* (b), *Quidam æger, qui infernam alvum ejecit lumbricum mortuum, & simul cum ipso vitam amisit. Erat tamen Lumbricus longitudinis viginti digitorum, & rotundus, & in rotunditate æquabat magnitudini carpi manus hominis robusti. Erat sanguine plenus: & in vase testaceo immissus, facta sanguinis expressione rejecit à se plusquam unam sanguinis libram cum dimidia, &c.*

T A B. IV. Fig. 1. shews the upper Side of the Worm.

A B C D, The Head.

C D, The Neck by which it was joined to the Body: The smaller Rings represent the Hollows formed by the joining of the protuberant annular Surfaces.

Fig. 2. Represents the under Side of the Head, and two Rings of the Body.

A

(a) Pag. m. 280. (b) De morbis internis, lib. 4. cap. 16.

A B C, Its triangular Mouth.

D E, Part of the Band that runs along the whole Body on its under Side.



XXVII. *Inability of Coition from the Piles.* By WILLIAM COCKBURN, M. D. *Fellow of the Royal Society, and of the Colleges of Physicians of London and Edinburgh.*

A Woman, related to one of the most eminent Midwives in this Place, had such an intollerable Pain when she had any Commerce with her Husband, as rendered the Action impracticable. The Midwife having a great Opinion of the late Dr. *Hugh Chamberlain*, desired his Assistance for this unhappy Woman. He judged her Case to be a Cancer of the Womb, and ordered her what he thought best for her Relief. She was frequently purged, made Use of Fomentations, besides alterative Medicines.

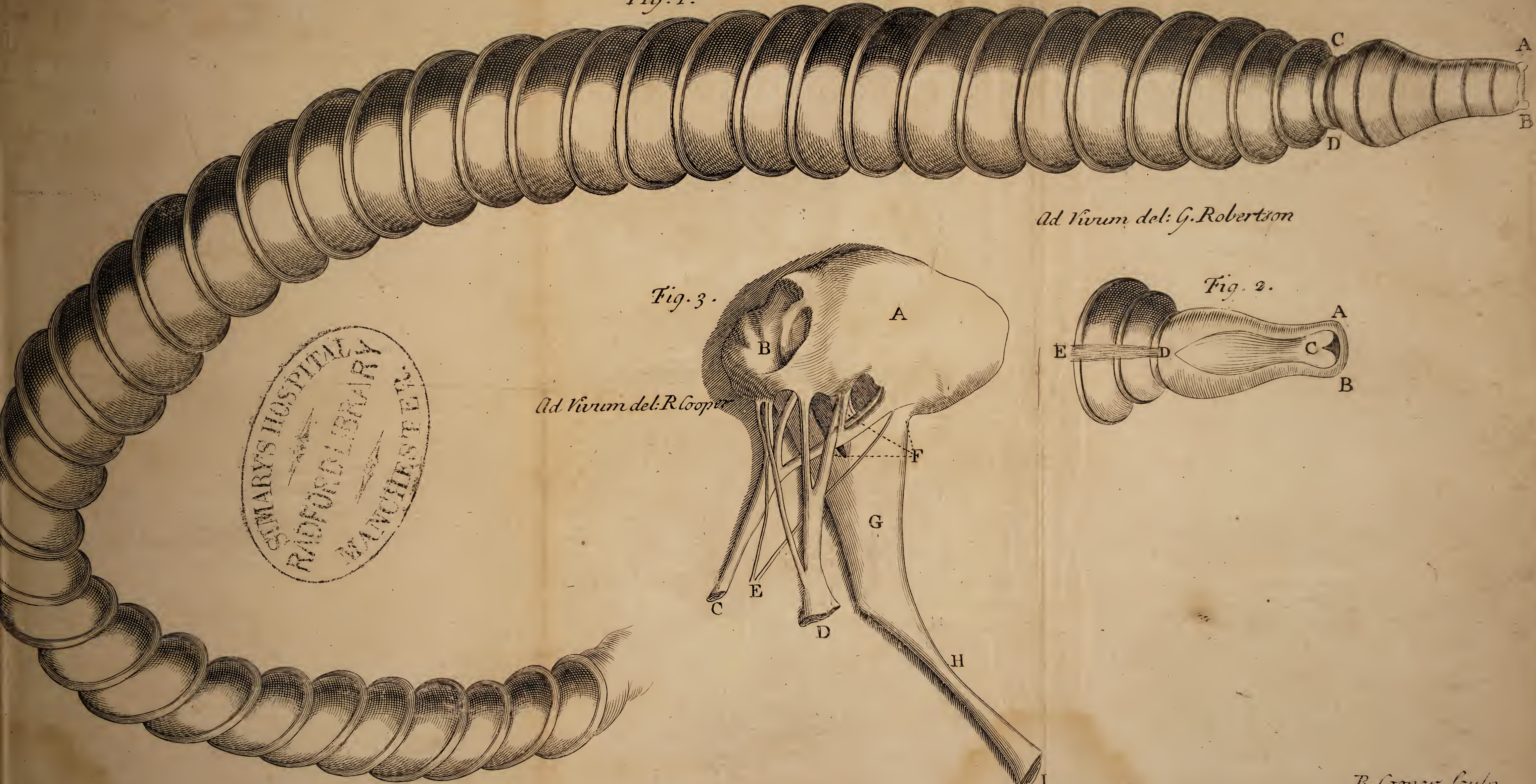
This Method was continued for some time, but finding no Relief that Way, Sir *David Hamilton* was afterwards advised with;

with ; and no Ease coming from that Quarter, my Assistance was desired.

The unfortunate Woman made no great Complaints of Pain, but in the Time of Coition. Mrs. *Cotton* examined the Womb, and could not find any Discharge from it, nor any Hardness, Schirrhus or Callosity about the Neck of the Womb. Now as that Part appeared to be blameless, I found she was troubled with the inward Piles; and they were kept much upon her, with the Purging and other Administrations; I suspected that the Pain in Coition proceeded altogether by pressing the Piles, when the *Penis* stretched out the *Vagina*.

On that View I attempted the Cure of the Piles, and with so great Success, that at once she was cured of her Disease, and admitted of the Embraces of her Husband without any further Complaint; so necessary it sometimes is to attend minutely to the Situation of Parts, as well as the supposed Affection, or the Methods of Cure.

Fig. 1.



Ad Vivum del: G. Robertson

Fig. 3.

Ad Vivum del: R. Cooper

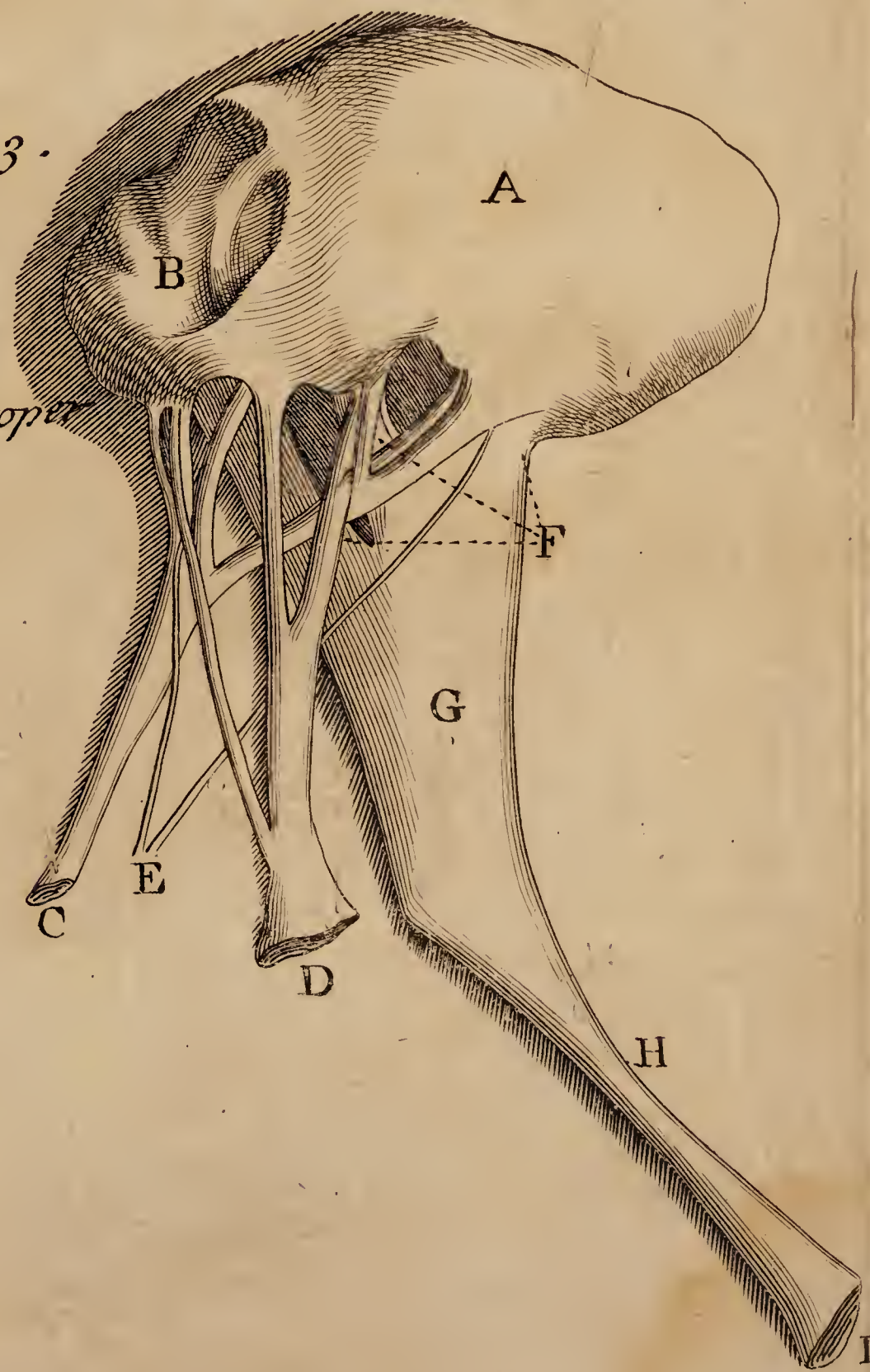
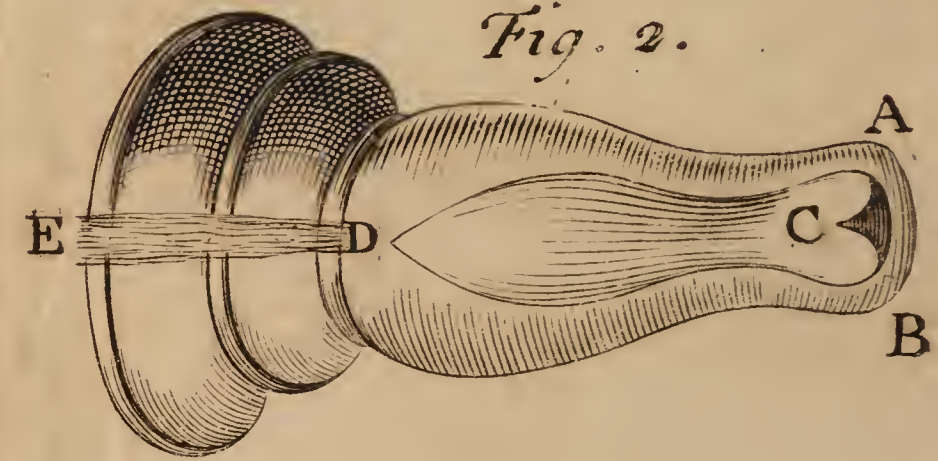


Fig. 2.



R. Cooper Sculp.

XXVIII. *Jaundice from Concretions.*

By Dr. THOMAS SYMPSON, Professor
of Medicine in the University of St.
Andrews.

THE Histories of icterick Cases, which confirm the Account of the Jaundice, depending most frequently on Concretions lodged in the biliary Ducts, as is argued for in *Art. XXXIII.* of your first Volume; such Histories, I say, are to be met with in great Numbers in Observators; but are generally told so superficially, that they serve very little to explain the *Phænomena* of the Disease; and therefore the following Case I hope will not be unacceptable, since it illustrates pretty accurately a general Doctrine which you have thought to merit the Attention of the Publick.

Mrs. *Forbes*, aged about Forty, the Mother of several Children, of a sanguine Constitution and sedentary Life, about the Beginning of *April* awak'd in the Night with an acute Pain, at the *Scrobiculus Cordis*, and Part of the Back opposite to it; a quick, hard and full Pulse, great Sickness, unsatiable Thirst, excessive Heat; no Food

however mild staid upon her Stomach; without taking any thing, she had frequent Reachings and Vomiting. The Blood, which was let plentifully from the Arm for these Symptoms, was Rheumatick to a great Degree. The fourth, fifth, and sixth Days of her Trouble, she raved, had the Hiccup, and fainted frequently. The three following Weeks, wherein she was often bled and received Clysters, as she had done from the Beginning, the Symptoms became easier; but about this Time we observed her whole Body coloured with a deep Yellow, and that every thing put into her Urine, came out coloured the same Way, while what she passed by Stool was white: This determined me to venture her with a purgative Infusion of *Senna* and *Rhubarb*; after which we observed her Stools for some Days coloured, tho' the Skin was little changed, and all the Symptoms abated. Shortly after they made a new Attack upon her, attended with vomiting, Pain at the *Scrobiculus*, a small Uneasiness at the Region of the Liver, universal Itching, Feebleness and Oppression without the Fever, and other severe Symptoms, which took Place at first; the Potion was again administered with the same observable Success as formerly; but, ten Days after, a third Attack

Attack of the same Nature with this last was made, which yielded nothing to the Physick, though several Times repeated; wherefore I now ordered her Pills of *Venice Soap* and *Aloes* equal Parts, to be taken gradually till they should produce a Looseness: Upon their operating, she was sensible of a Pain striking from the Region of the Gall-bladder towards the *Linea alba*, as she had frequently felt before, and accidentally viewing her Stools, she found them bilious, with some kind of compact distinct Bodies swimming in them, most of them bigger than Pease; nine were found at this Time, and as many the next Day, the Purging being still continued; and now the Symptoms greatly remitted, but returned again in a few Days; in which Fit, continuing her loose Belly, she past two of the same Bodies; and in a following Fit, which was a few Days after, four: And we observed, that every Time the Symptoms remitted, the Stools were bilious.

After these she had full three Weeks Interval, with considerable Ease; but then she had one of the worst Fits she ever had, except the first, she being feverish and vomiting under it, &c. I being from home, she got nothing until the third Day, wherein she took her Pills, purged, but nothing

appeared; next Day she rode, to no Purpose; the fifth Day her Pills were repeated, she purged, and passed a Stone as large as a Bean, of a prismatick Figure, impressed on one Side, as if another Stone had been adhering to it, which I found to be the Case of several she had formerly passed: After which she continued sometimes riding, purging, bathing in warm Water, and has now recovered her Health, without any further Molestation from the Jaundice.

The Stones passed were of a brown colour, finely polished; so that they felt smooth and oily like Soap: They differed much in Figure, and were all angular and irregular, except two, one of which was of a Prismatick Figure, as above, and the other exactly triangular, with two equal Sides: When divided, they appeared composed of different Crufts, tho' these were not perceptible near their Middle: They were bitter to the Taste; and (except some of the biggest which equalled a Hazel Nut) they all swam in fresh Water, the biggest descended slowly. The Number we got in all was twenty six; but we suspected several besides had passed in the first Fits, before the Stools were examined; and we reckoned not without some Reason, since we never found the Fit to yield afterwards, with-

without meeting more or fewer of these Concretions.



XXIX. *Faundice, with Suppuration of the Liver*: By Dr. JAMES DUNDAS, Fellow of the Royal College of Physicians in Edinburgh.

A Gentleman of a thin Habit of Body had been thrice seized with the *Faundice*, from the forty fifth to the fifty ninth Year of his Age; this Disease being each time preceeded, for some Months, with sharp deep-seated Pains of the *Epigastrium*, which began three or four Hours after eating, especially after solid Food, and continued an Hour or longer.

These Pains were for most part uneasy to him while the *Faundice* remained, which was near a Month, but decreased as the Disease went off; though for two or three Weeks thereafter a full Meal of solid Food used to occasion a Return of the Pains.

From the last Attack of the Pains, which happened about seven Months before his Death, his Flesh wasted considerably, without

out any Diminution of his Strength, till the Jaundice had their ordinary Course ; soon after which the Patient having gone to the Country in the Month of *March*, and having used much Exercise there, enjoyed very good Health for six Weeks.

Towards the End of *April*, after having rode some Miles in a very cold Day, he felt a constant internal Pain in the right *Hypochondriac* Region and in the *Epigastrium* ; which last encreased upon eating solid Food.

These he did not much regard, but took an *Anderson's* Pill, which he commonly used when costive. This Purgative occasioned a *Diarrhæa*, which confined him some Days to the House.

The Looseness being stopp'd, he rode out after Dinner, on the fifth Day after the Beginning of this Relapse, the Weather being very cold. At his Return home the Pains were much more violent, and were attended with a great Heat and Thirst, difficult Breathing, an ill Taste in his Mouth, want of Appetite, with a Sickness, as he called it, sometimes in his Stomach ; and he could not sleep at Night.

Next Day the Jaundice appeared, and the former Symptoms having encreased, he was confined to his Bed.

The

The Symptoms became still more violent the two following Days ; and on the second of them his Pulse intermitted, and he had a severe cold Fit, with great Trembling, both Evenings.

Next Morning, which was the ninth Day from the first Attack of this Disease, I first saw him, his Pulse was strong, full, a little frequent, and intermitted at the eighth, twelfth or sixteenth Stroke ; his Breathing was quick, but less difficult than it had been : His Skin was very warm, and he complained of very great internal Heat. The Pains were much abated, and scarce troubled him, except at a large Inspiration. The Pain in the right *Hypochondre* was sharp, upon lying on the left Side. He had sometimes a Pain about the right *Clavicle*, which he told me had been more frequent the Day before. He was sensible of a Weight in the right *Hypochondre*, and his Stomach was much oppressed by every Thing he swallowed. His Urine was in small Quantity, very high coloured, and soon became turbid. The Colour of his Skin was not so yellow as it had been : I caused eight Ounces of Blood to be let, which soon was covered with a thick inflammatory Crust of a yellow Colour. I then ordered him to take every Hour two Ounces of
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an aperient Decoction, a little warm, and to wash it down with a Spoonful of a mild acidulated Cordial Mixture. At Night I prescribed a gentle hypnotick Draught, which procured him sleep all Night.

On the 10th he was again blooded, and his Blood had the same Appearance as formerly. The Draught having been neglected this Night, he did not sleep well.

When I visited him again on the 11th, he complained of a pretty sharp Pain in the right *Hypochondre*, but the other in the *Epigastrium* seldom was uneasy to him. The Heat of his Skin was much less, tho' he affirmed the internal Heat was much the same. He had some Appetite, and Food did not oppress his Stomach. His Tongue was covered with a Crust of a brownish white Colour. His Urine was more plentiful, and not of such a deep Colour, soon letting fall a lateritious Sediment. His Pulse was weaker and smaller, and free of Intermission in the Forenoon, but in the Afternoon was unequal in the Strength and Fulness of the Stroke.

I continued the former Prescriptions, and desired he might take some *gummos cardiac Pills*, with Soap and a *terebinthinat Clyster*, Morning and Evening, and caused all the pained Parts to be covered with a Plaister
compo-

composed of the *Melilot* and *Diachylon cum Gummi* Plaisters and *Gum Ammoniac* mixed.

From this Day his Urine settled well, and had a great Quantity of a lateritious Sedi-ment; and he always slept well, except when his Pacifick was omitted.

I saw him again on the 13th at Night; his Pulse was then less frequent, equal, stronger, and more full, but intermitted at every thirtieth or fortieth Stroke. His Respiration was freer. The Heat of his Skin was moderate, and his Sense of internal Heat much less. The Weight at the right *Hypochondre* was much diminished. He felt no Pain, and could ly more easily on his left Side. His Thirst was less; and he sat up while his Bed was making. He had had four loose Stools in this and the preceeding Day.

Next Morning his Pulse was free of Intermission, stronger and less frequent; the Respiration easy. He felt no internal Heat nor Weight, and lay easily on the left Side. The yellow Colour of his Skin and Eyes was considerably less.

This Day and the following, his Respiration sometimes was difficult, and his Pulse had Intermissions. He slept much, and had no Stool till his Clysters were repeated.

The

The quieting Draught having been omitted on the 15th at Bed-time, he was restless all Night, and complained of Heat.

When I saw him the following Afternoon, his Pulse was quicker, larger, stronger, and equal; the Heat of his Skin moderate; but the Complaints of internal Heat were again renewed; his Respiration was quick and difficult; his Spirits were much oppressed, and he frequently sighed. The Crust of his Tongue was moist, and of a light brown Colour, his Urine turbid; as from the 14th. He had a copious Stool in the Evening; after which I caused a blistering Plaister to be applied to his Neck and Shoulders, and repeated his Draught with the usual Effect.

In the Morning after, he was more chearful and free of Sighs, his Spirits lively, his Pulse less frequent, and Breathing freer and slower; the Sense of internal Heat much abated; the Crust of his Tongue was dry, and of a dark brown Colour; the Yellowness of his Skin, &c. was less, his Urine of a deep Citron Colour.

In the Forenoon of the 19th Day of his Disease, he was perfectly easy; In the Afternoon he slept some Hours; and about six he awaked, with an exquisite Pain in his Belly; which was soon followed with

a continual vomiting of a black most viscid Liquor, and with very difficult Breathing. These Symptoms put an End to his Life in a few Hours.

When his Body was opened next Day, a considerable Quantity of purulent Matter was found in the Cavity of the *Abdomen*, which we judged to have come out of three Abscesses we observed in the Liver; the first was a large one, formed on the superior convex Part of the large Lobe, near the *Coronary* Ligament; the external Coat of the Liver, which had been raised here into a Bag, was much thickened, very tender, and mostly white, but in many Places red, as if it had been injected. The second Abscess was near the inferior Margin of the same Lobe; and the third was near the Gall-Bladder. The external Membrane of the Liver was much inflamed in many Parts of the convex Side of this Bowel; and the Substance of the great Lobe was very tender.

The Gall-bladder was very tender, and contained eight calculous Concretions, of different Bigness and Shapes; the largest was flat, and about the Bigness of a Turkey Bean, the smallest was not so large as a Grain of Barley. They were of a black Colour externally, but were of a brownish Gray

Gray within ; and some of them had a *Nucleus* of a white Substance. These Stones floated in a great Quantity of a thick dark brown or blackish Humour, resembling *Mum* in Colour and Consistence. The Stomach also contained a great Quantity of the same Liquor, was much inflamed, with Numbers of red Points ; and at its *Fundus* and left Orifice the Vessels appeared as if they had been injected. No *Rugæ* were observable on its internal Surface. The *Colon* was also inflamed.



XXX. *An extraordinary large Gall Bladder and hydropick Cystis.* By Mr. JOSEPH GIBSON Surgeon in Leith, Member of the Society of Surgeon Apothecaries of Edinburgh, and City Professor of Midwifery.

WILLIAM GORDON, of a healthy Habit, when about twelve Years of Age, in *October* 1721, fell from a Wall of three Yards perpendicular Height a-cross an old Tree, on which his right Side struck ; and he immediately complained of an acute Pain all over the Bastard Ribs of
that

that Side; but by repeated Blood-letting, it decreased into an obtuse heavy one, or rather a Sense of Weight; which not being so considerable as to confine him at home, or to restrain him from Play, was not taken further Notice of by his Relations, till after some Months, when he was observed to grow lean, to eat little, and to be less fond of Diversions than usual, which giving the Alarm, he was advised to go to the Country, and to be put on a Diet of Whey, with Riding on Horseback; both which (the Season favouring) he followed, and returned to Town after Harvest in seeming good Plight, without any other Complaint than a little Weight or Weariness, as he expressed it, in both his Sides, upon running, or any violent Exercise: But had not been long at home, till I was consulted about him. He then complained of the Pain in his right-side, had lost his Flesh and Colour, and was become exceeding slothful: A few Weeks added a long Train of other yet more direful Symptoms; for he suffered a constant Pain in his Stomach; vomited often, drank much, had his Tongue parched, his Skin dry and hot; his Pulse was frequent and feeble, his Urine crude, and in small Quantity, his Belly very costive, and what Excrements he void-

ed were white; he breathed quick, his Legs pitted towards the Evening, and a hard circumscribed Swelling began to appear in his right Side, and increasing daily, stretched itself over the *Scrobiculus Cordis*, to the left *Hypochondrium*, raising the under Part of the *Sternum*, and forcing outwards the false Ribs of both Sides.

His Legs, which only pitted towards the Evening, during eight Months after his Fall, were in *November* 1722, constantly swelled, as were his Thighs and Belly. About the Middle of *January* following, Water was felt fluctuating in his *Abdomen*, and till the Beginning of *April* thereafter, all his Symptoms encreased daily, especially the Difficulty of Breathing, which did not allow him to sit, far less to ly down; but some Days before his Death he was obliged to stand erect, supported by Chairs, Tables, or the People about him, while he slumbered.

This melancholy Situation made him beg so earnestly for Relief in Breathing by Tapping; that I yielded to his Importunity, though I had always assured his Relations, there were no Hopes of removing his Disease by that Operation, because the Dropsy was of the incysted Kind, and the Water was inclosed in Vesicles. Having applied

a laced fenestrated Bandage, supported by a Scapular, in order to prevent the Faintings which commonly do ensue, and have often proved fatal, upon drawing off at once all the Waters contained in the Belly of hydropick People, without this or some such Precaution. I placed my Patient in the most convenient Posture his Case would admit; and in Presence of Mr. *Edward Hawkins*, Surgeon to my Lord *Delorain's* Regiment, and of Mr. *Adam Lindsay* Chirurgeon-Apothecary in *Edinburgh*, I drew off by the Trocar, near three *Scots* Pints or twelve Pounds of Water of a greenish Hue, having a gross Sediment of the same Colour. The lower Part of his Belly subsided to very near its natural Dimensions after this Evacuation; but its superior Part did not in the least diminish. While the Waters ran out, the Bandage was proportionally straitned as his Breathing would permit, and the Wound was dressed as usual. He died the second Day after the Operation, being the third of *April*, and I was allowed to inspect his Body on the fifth.

I was assisted in the Dissection by one of the Gentlemen present at the Operation, and by Dr. *James Crawford*, late Professor of *Hebrew* and Medicine in the University of *Edinburgh*, whose universal Literature,

and consummate medical Knowledge, joined to all those amiable Qualifications which make up the beautiful Character of a good Man, and sincere Friend, must make all who had the Happiness to know him best, to bemoan with me their own private, and regrave the publick Loss of him.

When the *Peritonæum* was cut open, the Contents of the *Abdomen* had such a different Appearance from what they usually bear, that we had the greatest Difficulty to distinguish the *Viscera*. The *Omentum*, which was first in the Way, was not at all fatty, but had its Blood-vessels very conspicuous, and some other Vessels, that were exceeding small and numerous, were observed on it, which we took to be the *Ductus Adiposi Malpighii*. At the lower Part, where the Caul is ordinarily free, it adhered so very firmly to the Intestines, that it could scarce be separated without tearing.

The Stomach was rather less than ordinary, and was pressed by the Gall-Bladder and Spleen, into an oblong Form, not much unlike the *Cæcum*.

The Intestines and other *Viscera* of the *Abdomen* (the Liver, Gall-bladder, and Spleen excepted) appeared almost as usual,
only

only were more tender, scarce bearing the Touch.

The Liver was not much bigger than ordinary; but 'tis convex Part adhered so intimately to the Diaphragm, as it was impossible to separate them without the Help of the Knife. When this *Viscus* was cut a great Number of spherical Tubercles, about the Bigness of a common Bean, appeared in its Substance; some of the Gentlemen then present, were inclined to esteem these to be Glands; but how justly I am not to determine. It was observed that they had no Vessels either entring in or going out from them, and seemed only to be set loose in the Substance of the Liver.

The *Gall-bladder* was continuous to all the Concave Part of the Liver, and was extended to a most surprising Bulk, for it contained no less than two *Scots* Pints, or eight Pounds of Bile, rather thicker than the Cystick generally is, and of which several concentrical Bags, inclosed one within another were formed; these had all the Internal Figure of the *Gall-bladder*, and differed from each other only in this, That those which were next to the *Vesica*, were firmer and more opack, while the more internal were of a lighter green Colour, and of a more tender Substance.

The *Ductus communis cholidochus* was larger than usual, and was filled with many small spongy Stones of a yellowish Hue that swam in Water.

The Spleen was natural in its Substance, but adhered to the Diaphragm as the Liver did; and it had an additional Coat from that Part of the *Peritonæum* which covers the Diaphragm. This and the common external Coat, formed a preternatural *Cystis* that contained three *Scots* Chopins, or six Pounds of a clear *Serum*, without Smell, but exceeding salt, and not coagulable.

The Liver and Spleen were continuous, by a small Lobe that went from the lower Edge of the Liver under the Stomach, and terminated membranous into the *Cystis* of the Spleen.

This extraordinary *Gall-bladder*, and preternatural *Cystis* annexed to the Spleen, are still in my Possession, ready to be shown to any of you who will take the Trouble to examine them.

I shall not transgress your Rules, by subjoining any theoretical Account of this Boy's Symptoms; but beg leave to be allowed to apply this History to that excellent Essay of an anonymous Author on the Jaundice, which is the XXXIII. *Article* of your first Volume,

Though

Though at first View of the Case I have related, it seems to contradict what is argued for in that Article, by the Boy having no icterick Symptom, notwithstanding the cystick Bile was prevented from passing down into the Intestines, by Stones lodged in the *Ductus cholydochus*, and the *Gall-bladder* was so full of it, yet when we consider how very viscid this Boy's cystick Bile was, that it was formed into concentrical Bags, and therefore could not regurgitate, or be reassumed into the Blood-Vessels, which the Author of the Essay always supposes necessary for occasioning the Jaundice, this History will rather appear favourable to his Opinion.



XXXI. *An uncommon Suppression of Urine, with a preternatural Size of the Kidney. By Mr. GEORGE BALDERSTON Chirurgeon-Apothecary in Edinburgh.*

A Woman about thirty five Years of Age, frequently complained of *Nephritic* Pains for two Years, and often passed Sand with her Urine. In *August* last she

she was carried home from the Harvest Field, having been laid aside from Work, by a violent Pain of the right Kidney; she was soon relieved by a Clyster, and past a few small Stones. Ten Days after, she was taken ill again in the same Manner, when in one Morning she past twenty five small Stones, and three or four at a Time of the same Size, for several Days afterwards. Through the Winter she constantly vomited solid Food immediately, but kept Liquids for most Part till Bed-time. Her Pains frequently returned; but no Stone appeared, till about three Weeks before her Death, that she past three or four more in a Morning, and was soon after seized with a Suppression of Urine, which continued almost total for fifteen Days; having in that Time not voided above a Gill of Water, and that only by Drops, deeply tinged with Blood, and attended with the utmost Pain and Uneasiness; Her Belly at the same Time was much distended, and pained, especially about the Navel and *Regio Pubis*.

In this Condition I found her at my first Visit on the 16th of *May* 1733. I immediately sounded her, and imagined I found a Stone, which easily yielded to the *Catheter*; she felt immediate Ease, though she voided but a few Drops of Urine, and
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On withdrawing the *Catheter*, I perceived a considerable Resistance, as if one had been pulling against me. In the Afternoon she was seized with a violent Pain in the right Kidney, and Ureter of the same Side. I ordered her a Turpentine Clyster, and a pacifick Mixture to be taken as soon as it was past: About ten that Evening she voided half a Mutchkin of Urine, and was much eased both of the Pains, and Distension, and Swelling of her Belly.

Next Day she was free of Pain, but very sick, and vomited whatever she took. I caused her to drink plentifully of a Decoction of *Althea* Root, most of which she threw up: In the Evening she got a Turpentine Clyster, and was ordered to take the pacifick Mixture after it was past, but she kept the Clyster all Night.

The Day following, finding the Clyster still remained in her Body, I ordered her a Pound of a Ptisan of *Senna*, *Tamarinds*, and *aperient* Roots, of which she drank a Gill every Hour while it lasted. She vomited most of the Ptisan, which however, about ten at Night procured her two Stools. She got the Paregorick immediatly after, and had an easy Night.

She passed the 19th Day pretty easily, without taking any Medicine.

On

On the 20th the *Ptisan* was renewed, with the Addition of *Rhubarb*; but she threw it up so quickly, that it had little Effect on her Belly: The vomiting encreased towards Evening, when I gave her a Stomachick Opiate Mixture, with *Sal Absinth.* and *Syrup Limon*, to be taken in Spoonfuls, and sometimes a Glas of *Rhenish Wine*. The Pain she formerly complained of at her Navel and *Regio Pubis* now removed to the Stomach, and seized chiefly its upper Orifice.

On the 21st, before Noon, the vomiting ceased, and returned no more; she continued the Mixture and *Rhenish Wine*, and took a little Bread-berry; but her Breathing became laborious, and wheezing, tho' her Pulse continued calm and strong, as it had been all along. About four after Noon she was seized with Convulsions so strong, that four Women could scarce keep her in Bed: Soon after her Pulse became weak and irregular. About two in the Morning she had a second Convulsion, which brought Blood from her Mouth: After which she lay calm, but sunk gradually till ten before Noon that she died.

During the whole Course of her Disease, she never could ly on the left Side, but was
all

all along free of Pain both of left Kidney and Ureter.

Upon opening the Body before Dr. *Andrew Sinclair*, Professor of *Medicine*, and Dr. *Moncrief*, we found the Muscles of the *Abdomen* extreamly thin, a considerable Quantity of Water betwixt them and the *Peritonæum*; and likewise some Water in the Cavity of the Belly.

The Stomach was found; most of the small Guts slightly inflamed.

The Liver very large, but not hard; the whole convex Surface of the right Lobe strongly attached to the *Peritonæum*, the Extremity of its left Lobe contiguous to the Spleen.

The Spleen considerably larger, thicker, and softer than usual.

The *Uterus* inflamed, with both its *Cornua* obstructed by a tough white Matter of an unequal Consistence.

The *Ovaria* much contracted, flat and white, without any *Ova*.

That Part of the *Peritonæum* which covered the right Kidney, of a very unnatural Thickness.

The right Kidney of a monstrous large Size; the Blood-vessels on its Surface very red and turgid. Upon making an Incision into its external convex Side, a small Quantity

tity of *Pus* was found near the *Pelvis*; in the *Pelvis* it self was contained a large Stone, and a great Number of smaller ones of different Shapes and Sizes; none of them exceeding the Bulk of a common Pea, and none less than a great Pin's Head.

The *Ureter* on the right Side, little above the natural Size.

The left Kidney so small, that with Difficulty it was found; neither Stone nor Sand in any of three small Cavities which it had instead of a *Pelvis*.

The left *Ureter* very large near the Kidney, then much contracted, and afterwards dilated again above the natural Dimension. See *Fig. III.* which exhibites the Dimensions both of Kidney and Vessels.

There was nothing found in the Bladder.

Explication of Fig. 3. TAB 4.

A The Kidney as large as the Life.

B One of the Cavities that supplied the Want of a *Pelvis* opened by Part of the Substance of the Kidney being cut off.

N. B. The three Cavities had no Communication with each other within the Kidney; and though there were some small urinary Canals opened into each, I could not observe any *Papilla*.

C. The

C, The Trunk of the emulgent Artery.
D, The Emulgent Vein.

E, The Nephritick Nerve. The Branches of all these Vessels going to the Kidney, are delineated, but need no Explication.

F, the Canals coming out from the three Cavities, to compose one large Sac G, at the Beginning of the *Ureter*.

H, The *Ureter* preternaturally straitened.

I. The *Ureter* again dilated to the ordinary Size.



XXXII. *A Suppression of Urine, from a Palsy in the Bladder. By Dr. FRANCIS PRINGLE, late President of the College of Physicians in Edinburgh.*

A Gentleman about seventy three Years of Age, of a healthy Constitution, and full Habit of Body, was seized on *Tuesday June 22d*, with a total Suppression of Urine, attended with Pains about the *Os Pubis*, Region of the Loyns and Kidneys, and with frequent Vomitings of a darkish Coloured Substance, resembling Coffee or Chocolate, he had also frequent Returns of the Hickup, and complained of a scalding

ing Heat, when he swallowed any Drink, especially if it had the least Acrimony.

He continued two Days in this State, notwithstanding his having been let Blood by his Surgeon, who also gave him several Clysters, and a Decoction of the aperient Roots, with *Sal. Prunell.* for Drink.

Being called to him on *Thursday June 24.* I immediatly ordered him to be sounded, and three Mutchkins and a half of a dark coloured mossy Urine were voided by the *Catheter*. After which the black Vomitings and Hiccup ceased; and he found so much Relief every Way, that he delayed the Use of the *Semicupium* which I had caused to be prepared for him; but he had emollient Terebinthinate Clysters injected; and he continued the Use of the aperient diuretick Decoction, to the Materials of which, some *Althea* Roots were added.

Next Day having passed no Urine, he was put into a *Semicupium*; and that availing nothing, he was again sounded, and passed some less Quantity of Urine than was taken away before. While the Surgeon sounded him, the *Catheter* met with little or no Resistance; neither was there any Appearance of Stone, Ulcer, or Caruncle in the Neck of the Bladder; nothing came away with the Urine, except a Drop
or

or two of coagulated Blood, and some sandy gritty Sediment.

He continued in this Condition, till the *Saturday* Evening, when he was obliged to be sounded again; and his Pulse being frequent and strong, he was blooded. On *Sabbath* he was sounded for the fourth Time, was again put into the *Semicupium*, and a laxative purging Ptisan given, which answered well enough.

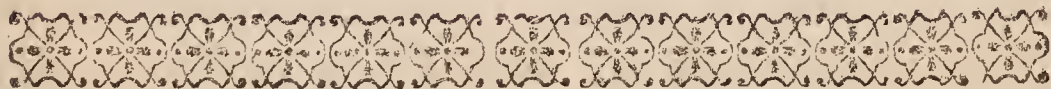
From the first Time he had been sounded, the black Vomitings left him, but he was troubled with the Hiccup from Time to Time, which increased so much on *Tuesday June 29th*, being accompanied with a low depressed Pulse, and Coldness of the Extremities, that it was judged proper to apply a blistering Plaister between his Shoulders at Night; and besides the former Medicines, he was ordered to take frequently a Spoonful of the Solution of *Balsam Copayb.* to which some Guts of the *Ol. Macis chemic.* dissolved in Sugar were added. He slept well all Night, and was quite free of the Hiccup, and had a good Pulse next Morning; but passed no Urine till the *Catheter* was again introduced. Upon removing the Blistering Plaister, he felt some sharp Pains, resembling those of a Strangury, which were probably owing to the
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the Blister: He was therefore ordered to drink plentifully of the *Emulsio Arabica*, and at Bed-time, to take a Bolus composed of *Pulv. Rad. Valerian Silv. gr. x. Castor. Russ. Sal Succin. Camphor. ā gr. v. Extract. Opii. gr. i. Syrup. Cariophyll. f. q.* which eased his Pains, and procured him a pretty good Night. At the same Time he continued to take the Solution of *Bals. Copaib.*

On the three following Days he continued much in the same Way, being sounded every Day to evacuate the Urine, which he never passed without the *Catheter*. *July 3d*, he was ordered to drink plentifully of *Piermont Water* and *Rhenish Wine*, and *Pareyra Brava* was added to his ordinary diuretick Decoction.

July 4th and 5th, there was scarce any Change; his Decoction, *Piermont Water* and *Rhenish Wine* were still continued. On the 6th, 7th, 8th, being a little stronger, he rode sometimes out in a Chaise, and continued in the Use of the same Medicines, only half a Drachm of the Oil of *Juniper*, and as much ætherial Oil of Turpentine were added to six Ounces of the *Copaiba Mixture*. On the 9th or 10th he had a gradual slow Discharge of more than a Pound of Urine, without the Assistance of
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the *Catheter*, which the total Suppression he had of Urine, put us under the Necessity of introducing every Day from the Beginning of his Disease, till the 17th or 18th *July*, when he came to void his Water in the natural Way, and regularly. He continued the *Rhenish* Wine, and Spaw Water, with riding on Horse-back, or in a Chaise for some time, making rather more Urine than he formerly was in Use to do, and has continued in good Health ever since, without having any Occasion to be founded.



XXXIII. *An Account of medical Discoveries, Improvements, and Books published in the Year 1731, and omitted in the first Volume of this Collection.*

Discoveries and Improvements.

DR. *Stahl*, first Physician to the King of *Prussia*, recommends the *Erysimum* or *Verbena femina* as a good Medicine for Schirro-cancerous Tumors, both when taken internally, and applied to the Tumor. Mr. *Bingert* Surgeon at *Berlin* com-

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municates two Histories of its good Effects in such Cases. *Act. medic. Berolin. Dec. 3. Vol. 1. p. 59.*

Morgagni confirms by several Experiments what *Burlet* had affirmed of *Aq. Calc.* not coagulating Milk, *De Bonon. Art. & Scient. Instituto atque Acad. Comment. p. 155.*

The Powder of the *Fungus thyphoides coccineus Melitensis*, is recommended as a good and safe Styptick in *Hæmorrhagies*, *ibid. p. 158.*

Mr. *Le Dran* mentions several Examples of his Success in curing white Swellings of the Joints, or Tumors occasioned by a Collection of inspissated Lymph, by a small Stream of warm Water falling from a Height upon them. When the Water is impregnated with penetrating Medicines, or natural Minerals, its Virtues are greater. Besides the Use of these *Douches*, as he calls them, he also recommends the Application of Bladders containing warm Water, to the Parts affected with such Diseases. *Le Dran Observations chirurgicales, Tom. 2. Observ. 93, 94.*

Mr. *Bailleron* Surgeon affirms, that a Composition of Sulphur, Rosin, and Honey, proves an Escharotick Medicine, but gives little or no Pain, *ibid. Observ. 100.*

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Morgagni has never yet fulfilled his Promise of publishing *Valsalva's* posthumous Works, which he proposes to comment on, and add Notes to: But by a short Abstract from his Papers now published, we may judge what Discoveries *Valsalva* is to treat of.

His first Dissertation is to be on the Ligaments of the *Colon*, which other Authors, and particularly *Morgagni* has prevented him in.

Next, he treats of the Sinuses of the *Aorta*. By *Sinus* he means any Part of an Artery, where its Sides are stretched outwards beyond the ordinary proportional Dimensions elsewhere. He observes four such Sinuses, three of them answer to the semilunar Valves; and the fourth is all that Part of the *Aorta* between the former Sinuses, and the Origin of the common Trunk of the right subclavian and carotid Arteries.

He then gives some Reasons why the *Nervus accessorius*, ascribed commonly to *Willis*, should not be said to have its Origin where the common Descriptions place it, but should on the contrary be thought to rise from the eighth Pair, to be joined to the *Medulla spinalis*.

Valsalva calls that Ring which the Muscles

scles of the Eye make round the optick Nerve at the Bottom of the Orbite, by the Name of the *Moderator Ring* of that Nerve, alledging that the exterior Fibres of these Muscles, which rise from the Nerve, must shorten it when they contract; and when the interior Fibres act, they must compress it; so that these different Fibres of the Muscles affect the nervous Fluid here very differently. Thereafter he accounts for several *Phænomena* of Vision from this Structure. He also describes such another Ring made round the Motory Nerves of the Eye; but acknowledges that it is neither so remarkable or distinct as the former.

The last Treatise mentioned by *Morgagni* is the one wherein *Valsalva* endeavours to prove the *Renes succenturiati*, or *Glandulæ renales* to be Organs of Generation, or assistant to them. *Valsalva* had endeavoured to secure the Honour of this Discovery to himself, by entring a publick Protest, that no other should claim it. Mr. *Ranby*, Surgeon to the King of *Britain's* Household suspected that the Duct, which the *Italian* literary Journals mentioned as the principal Part of this Discovery, was no other than an Artery sent off from that of the *Capsula* on each Side, to the Testicles

sticles of Men, and *Ovaria* of Women (See *Phil. Transf. Numb.* 387. §3. and *Numb.* 395. §12. (a) *Morgagni* has now explained *Valsalva's* Doctrine more fully.

Valsalva gives the following Reasons for his Opinion of the *Renes succenturiati* being assistant in Generation, by Means of their excretory Ducts. He observes the seminary Vessels of several Fowls to come out from these *Capsulae*, before they are sent from the Testicles. In the *Viper* and *Water-Tortoise*, he remarks such membranous Connexions between the *Renes succenturiati* and Testicles, as make it probable that such Excretories are sent through the *Capsulae* to the Testicles. He affirms his having seen Vessels that were neither nervous, sanguiferous nor lymphatick going from the humane *Capsulae* to the *Testes*. His Observations are much the same as to Females. To these he subjoins the Consent and Sympathy observed by Physicians between the Loyns, and the natural or genital Parts. To confirm all, he relates the following Experiment: He cut away one Testicle, and extirpated the Kidney of the opposite Side of a Whelp.

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(a) We beg Mr. *Ranby* would determine whether the Artery he describes is constantly or seldom found.

The Wounds healed, but the Creature was of a very lax Habit, and was so far from attempting Coition with Bitches that he did not seem fond of them when they were proud, *Acad. Bononiens. Comment. p. 376. &c.*

Petrus Nannius, after giving some Examples of vesicular Bodies found in the conglomerate Glands, which, he thinks, support the *Malpighian* Scheme of Glands, endeavours to prove the Necessity of such Vesicles for receiving all the different Particles required in the Composition of secreted Liquors, that must be conveyed in different Series of Vessels, to be intimately blended in the Vesicle, which will be considerably assisted by the Systole and Diastole, which he supposes the Vesicles to undergo. *Ibid. p. 336.*

Dominic Gusman. Galeatius having found small black biliary Concretions contained in *Folliculi* of the Coats of the Gall-bladder concludes *Malpighius's* Opinion of the Glands of the Gall-bladder to be thereby confirmed, *ibid. p. 352.*

Mr. *Lamorier* proposes some Improvement on the Operation of the *Fistula lacrymalis*; for he desires the *Os unguis* to be laid bare at the first Incision, and immediately after to pierce it with a Pair of strong

strong sharp-pointed crooked Forceps, then to dilate the Perforation, by opening the Forceps. After the Inflammation is over, he would have a Piece of small Wax Candle shaped like a Tent, introduced by the Wound into the Nose, where he secures it by the other Dressings. He continues the Use of this *Bougie* till the Passage is made callous, and out of Hazard of reuniting, after which he allows the external Wound to cure. The Advantages he proposes by this Method, are to abridge the Operation, and to secure a Passage for the Tears into the Nose. *Memoire envoyé du Montpelier à l'Acad. des Sciences* 1729.

Mr. *Le Dran* Surgeon at *Paris* has mentioned several Improvements in Surgery, in his two Volumes of Observations.

He cured a *Polypus* of the Nose, that he could not extract wholly, in the following manner, which may be practised for destroying all such Excrescencies. He introduced one Extremity of a large Seton, put on the Point of the Fore-finger of the left Hand, into the Patient's Mouth, till he brought it behind the *velum pendulum* of the Palate, then sliding a Pair of thin crooked Forceps, held in the right Hand, into the affected Nostril, he caught hold of the End of the Seton, and brought it out at the Nostril,

leaving its other Extremity hanging out at the Mouth. Every Day he shifted the Part of the Seton in the Nostril, after covering what was to be introduced into the Nose with a suppurant Medicine. While he drew the Cord, he endeavoured to preserve the posterior Edge of the *Velum pendulum* from being hurt; by introducing his Finger into the Mouth, and supporting the Cord upon it. He continued the Use of the Suppurant, till he was sensible by the Patient's breathing freely through the Nostril, that the Remains of the *Polypus* were destroyed, and then he injected Desiccatives to cicatrize the Ulcer. *Tome i. Observ. 6.*

In his Reflexions on this sixth Observation, he proposes to make such a Seton serve for stopping *Hæmorrhagies* of the Nose; for which Purpose he fastens two Dossils to the Cord, and after drawing one out at the Nostril, to bring away the clotted Blood, he continues to draw the Cord, and so fills up the posterior Part of the Nostril with the other, which ought to be larger, and well wet in a styptick Liquor, by which not only the *Hæmorrhagy* may be stopped, but if it should continue, the Dossil will effectually prevent the Blood and Medicines put into the Nose, from running down the Throat, which commonly occasion a Cough

Cough or Vomiting that increases the Bleeding. He confirms his Reasoning by the subsequent Observation, which is an Example of the Success of this Method.

In his Observations on Wounds of the Head, *viz.* from *Observ.* 15. to 29. he endeavours to show how much more dangerous the Case is, when the *Cranium* does not break by violent Blows, &c. than when it is fractured, because of the greater Commotion of the Brain, Contusion of the Skull, and Separation of the *Dura Mater* in the former Case, and therefore concludes it necessary to perform the Operation of the Trepan oftner than is commonly practised.

In his Reflexions on the 31. *Observ.* he remarks, That whenever any considerable Quantity of *Pus* is contained in either Cavity of the *Thorax*, that Side will appear larger than the other.

Tom. 2. Obs. 59. He describes a *Bistoury cachè* of his own Contrivance, for more safely performing the Operation for *Herniæ*. The Point of the *Bistoury* does not come out of the Furrow of the Directory, but slides in it, while the Edge of the Blade is raised, and there is a Wing or broad Plate that stands out on each Side of the Directory, to keep down the Guts, and there

thereby to prevent the Hazard of their being cut.

Observ. 80. He assures us, That when a small Stone is lodged in the Neck of the Bladder, the Patient only is pained in pissing, till the first Drops of the Urine come away. When the Stone in the Bladder is large, his greatest Pain is while the last Drops are evacuated; but when the Difficulty in urining depends on the Diseases of the Coats of the Bladder, the Pain continues all the Time of the Evacuation. By observing these Symptoms, he has determined People to have no Stone in their Bladder, after several others had assured them there was a Stone; and his Opinion was confirmed by probing with the *Catherter*. He names one particular Instance of this in a Person who laboured under what he calls a contracted hardned Bladder (*ves-sie retrecie & raccornie*) whom he cured after several Bloodings and Purgatives, by injecting into the Bladder the mucilaginous Decoction of *Rad. Alth. & Sem. Lini*, which he changed afterwards for Barley Water, with some *Melrose*; for by these he removed the Pain, and brought the Bladder, which could scarce contain at first two Spoonfuls of Liquor, to the ordinary Capacity.

Observ.

Observ. 112. He describes the Amputation of the metatarsal Bone of the great Toe. He cut with a Bistory between the affected metatarsal Bone and the one next to it, till his Knife passed beyond the carious Part, and even beyond the Swelling of the Teguments; then introducing a furrowed Probe between the Bones near the posterior Extremity of the Incision, he pushed his Bistory by the Help of it some way between the Bones, and made a semi-circular Incision upon the metatarsal Bone of the great Toe, first above and then below, so as to make a compleat circular Wound, and to lay that Bone bare all round; and immediately taking out the furrowed Probe, he introduced a thin Plate of Lead in its Place, and with a fine Saw cut the affected Bone through, the next one being saved from any Injury by the Plate of Lead.

Morgagni tells, That *Valsalva* shows, by several Reasons and Examples, the *Cataract* to be a Disease of the crystalline Humour, and not a Membrane.

The principal Difference, according to him, between a *Cataract* and *Glaucoma*, is, that in the latter Disease the crystalline Humour becomes hard, and of a sky
Co-

Colour (*glauci coloris*); and in the former it is soft, *Comment. Acad. Bonon. p. 377.*

Dr. *Albertinus*'s Remarks on some Faults of Respiration, depending on the lesed Structure of the Heart and *Præcordia*, will not admit of such an Abridgment as our Design allows; wherefore we must refer to the original Treatise, *ibid. p. 382.*

The same Gentleman observes, That all feverish Diseases, nay almost all Diseases, are followed by *Crises*; and that particularly after intermitting Fevers are stopped by the *Peruvian* Bark, critical Evacuations are to be expected: If they do not come timely, the Patient is in Danger of some other Disease, especially if any usual or habitual Evacuation has been hindred. In which Case it is dangerous to give the Bark, unless we are on our Guard to promote a suitable Excretion, if a *Crisis* does not soon come naturally, *ibid. p. 405.*

Cajetanus Tacconus, M. D. tried many Experiments with the Mucilage of the Joints of Brutes and of Men both sound and gouty, in order to discover whether the gouty Matter is acid or *alkali*; and concludes, that the Matter of this Disease is sometimes of the one and sometimes of the other Nature. The Signs by which he thinks they may be distinguished are these:

If

If the Gout produces no *Tophi* or Knots, or does it very slowly ; and especially if it is attended with oedematous Swellings, he pronounces it to depend on an alkaline Humour : But if the Knots are large, and quickly formed, he is of Opinion it is owing to an acid. The Method of Cure must consequently be very different according to the Cause, *ibid.* p. 148.

B O O K S.

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Dilucidazioni Fiſico-mediche del Dottor Sancassi ni tendenti à richiamare la medicina practica alla prezioſa Purità, in cui ce la laſcio il grande Ipocrate, con altri Trattati concernenti à tale importantissimo argomenti, fol. Roma.



XXXIV. *An Account of the most remarkable Improvements and Discoveries in Physick made or proposed since the Beginning of the Year 1732.*

THE *Small-pox* are generally believed to have been first observed and described by the *Arabians*; but Dr. *Hahn* endeavours to prove, in his Book intituled, *Variolarum Antiquitates è Græcis eruta*, that the *Small-pox* was described by the old *Greek Physicians* under the Name of *Carbuncle*.

In the Epistle to *Fabricius* tack'd to his *Variolarum Antiquitates*, the same Author uses many Arguments to show *Fanus Damascenus* and *Mesue the Syrian* to be the same Person.

The *Peruvian Bark*, so well known as a Specifick in the *Ague*, is now discovered to be as effectual in the Cure of Mortifications from an internal Cause. The History of this Discovery is: In 1715 Mr. *Rushworth* Surgeon in *Northampton* gave it to a Patient labouring under a Mortification; and

and having afterwards other Proofs of its good Effects in this Disease, communicated his Discovery in 1731 to the Master and Governor of Surgeons-Hall at *London*. Serjeant *Amyand* soon tried it in such Cases, and found it successful in seven. Mr. *John Douglas* confirms it by the History of a Patient of his, which he published in 1732 : And Mr. *Shipton* Surgeon soon after relates his Success by this Medicine to the Royal Society in *London*. Mr. *Rushworth* and Mr. *Amyand* confine its Use to Mortifications from an internal Cause ; and the former Gentleman thinks it is not proper in all Cases of that kind, particularly where there is no Intermission of the Fever, when only he advises it to be given. Mr. *Douglas* seems to think it will succeed in all Mortifications. All these three Gentlemen gave half a *Drachm* for a Dose every fourth Hour. Mr. *Shipton* increased the Dose to two *Scruples*, and gave it while the Fever continued. He proposes to have it tried in *Nomæ*, *Phagedænæ*, *Herpes*, or other chironian Ulcers. See Mr. *Rushworth's* Letter ; Mr. *Douglas's* Account of Mortifications ; and *Philos. Transact. numb. 426. § v.*

Jo. Ge. Henr. Kramerus assures us we may depend on the same Effect, in the Cure
of

of a Dysenterie, from the Decoction of common *Millet* Seed, called *St. Ambrose's Syrup*, as is promised on the *Simarouba* by Mr. *Fussieu Commerc. literar. Norimberg*, 1733, *Hebd. 6. § 3.*

Dr. *Dovar*, in his Physician's Legacy to his Country, having recommended Quick-silver as a most beneficial Medicine for several Diseases, Morning Draughts of crude Quick-silver became the Top of the Mode last Winter in *London*; which has occasioned the writing of a great many Pamphlets, some condemning, others extolling this Practice: But till the contending Parties are better agreed about their Facts, Cases and Histories, nothing positive can be determined.

Mr. *Boulduc* describes a Manner of making *Corrosive sublimate* more easily and safely, than can be done in the common Way. He pours equal Quantities of *Quick-silver* and *dephlegmated Oil of Vitriol* into a Retort; then, with the Help of Fire, dissolves the *Mercury*, and draws off the Phlegm, and Part of the Acid that does not incorporate with the Quicksilver: The Fire is continued till the white Mass of dissolved *Mercury* is dry, when he speedily mixes it with equal Parts of the whitest common Sea Salt, dried by a gentle Heat,

and not decrepitated. And putting all into a *Matras*, makes the Sublimation in the common Way. After it is all raised, he breaks his *Matras*, by taking it out of the Sand-heat while it is warm, or by putting a wet Cloth on it ; which prevents any of the *Sublimate* from falling down, as it does when the Glass is broke by striking on it. *Memoires de l'Acad. des Sciences*, 1730.

Mr. *Le Fevre* proposes a compendious easy Way of making *Colcothar of Vitriol*. He mixes two Parts of Filings of Iron with one of common Sulphur and a little Water ; after the Acid of the Sulphur has dissolved the Iron, he exposes the Paste to the Air, and it changes into *Colcothar*. *Hist. de l'Acad. des Sciences*, 1730.

Mr. *Petit* the Physician's Observations and Experiments on the Colour, Consistence, Measure, Weight, &c. of the crystalline Humour of the Eye and its *Capsula*, in different Animals, are so minute and numerous, that it is impossible for us to make such an Abridgment of them as our Design will allow ; we shall only observe, that he shows the Crystalline to consist of concentrical *Laminae* : He always found the *Capsula* transparent, and denies any Connexion between this Membrane and the Crystalline, or that there are any Vessels

sels going from the one to the other ; but that the CrySTALLINE is nourished by absorbing the Lymph that is lodged between it and its *Capsula*. *Memoires de l'Acad. des Sciences*, 1730.

Mr. *Winslow's* Remarks on the Motions of the Head, Neck and Spine, and Mr. *Hunauld's* Observations on the Bones of the humane Scull, are so particular, that we must refer our Readers wholly to the Original in the *Memoires de l'Acad.* 1730.

Dr. *Waltherus* Professor at *Leipsick* has given a very minute Description of the Muscles and Ligaments in the Sole of the Foot, which we cannot abridge ; and therefore must refer to the *Nov. Act. Erudit. Lips.* April, 1732.

Dr. *Alexander Steuart* Physician to the Queen of *England*, having cut off the Head of a Frog, observed, that upon thrusting a blunt Probe into the *Medulla spinalis*, the Muscles of the Body were brought into convulsive Contractions ; and that the same happened to the Muscles of the Head, when the Probe was thrust into the Brain. From which he concludes the Brain and Nerves to contribute to muscular Motion, and that to a very high Degree. Next, he laid bare the crural Artery, Vein and Nerve of a Dog ; and placing a Thread parallel to

them, he made two Ligatures on them, at four Inches Distance from each other; then cutting the Vessels through beyond the Ligatures, he took them out, and observed that the Nerve did not contract, though the Blood-vessels lost three eighth Parts of their Length: From whence he infers, that what the Nerves contribute in muscular Motion, cannot arise from, or be owing to Elasticity, but to the Fluid they contain; which he thinks the Name of Spirits unhappily contrived to express, because it is apt to mislead into an Idea of fermented or saline Spirits, whereas, says he, we have no Reason, from any Appearances we can observe, either in the Brain or Nerves, to judge these Spirits to be any other than a pure and perfectly defecated elementary Water. *Philos. Transact. Numb. 424.*

§ 5.

An anonymous Physician, after mentioning the Arguments used for and against the Nerves being composed of cylindrical Canals containing a Fluid, offers what he calls an *Experimentum crucis* in Proof of such a Structure; it is the Demonstration of the optique Nerve inflated and dried, which appears cannular to the naked Eye. *Present State of the Republick of Letters, Vol. 12. Art. 16.*

Mr.

Mr. *Browne Langrish*, in his Essay on muscular Motion, endeavours, (*p.* 14.) to prove the Blood to have no immediate Effect in muscular Motion; which he does, by Experiments of tying the crural and carotid Arteries of Dogs, who did not thereby lose the Action of any Muscles. He grants however (*p.* 16.) that when all the Blood is intercepted, muscular Motion ceases in a few Minutes. The chief Use of the Blood towards muscular Motion is, in his Opinion, (*p.* 19.) to keep the Fibres warm, supple, distended, and every way ready for the Influx of Animal Spirits into them; and by its expansive and progressive Motion, to assist the Motion of the Animal Spirits.

p. 23. He thinks the muscular Fibres to be little hollow Cylinders, and could never observe that they were divided into Cells, Vesicles or Bladders.

After explaining at large his Opinion concerning the Doctrine of Attraction and Repulsion, and observing the Elasticity with which our muscular Fibres are endowed, and how volatile, spirituous Things, Astringents, and cold Bodies incite the Muscles to a contractile Motion, and increase their Contraction, he supposes (*p.* 55.) the *Animal Spirits* to be near a kin,

or analogous to *Spirits of Sal Ammoniac*, Hartshorn, or humane Sculls; and therefore, whenever they fly from the Nerves into the muscular Fibres, they will increase the attractive Quality of their component Particles towards each other, so as to make them run nearer together, which will consequently occasion the Coats of the Fibres to be both thicker and shorter, and the Muscle will be contracted, having all its Dimensions rather diminished than increased. (*p.* 78.) The *Animal Spirits*, says he, are so subtle, that they cannot be fixed, and consequently they will immediately make their Escape through the muscular Fibres, and leave them in the same State they found them in, as soon as the Supply by the Nerves is by any means discontinued.

According to our Author, (*p.* 78.) there is a Difference in the Mechanism of the Nerves, which are sent to the Muscles that act by the Influence of the Mind, from those of the Muscles that are said to perform involuntary Motions, the latter having no Let or Hindrance to the Course of the Animal Spirits, unless sometimes the Parts through which they pass have Influence on them; whereas the Nerves which serve the Muscles of voluntary Motion have
some

some little Constrictions at their Extremities, or elsewhere, which hinders the Course of their Fluids, except when their Resistance is overcome by the *Momentum* of the Animal Spirits being increased by the Will.

He thinks, (*p.* 70.) the Use of the *Ganglions* is to prevent any Communication of Motion from one Nerve to another, whereby in a State of Health, Sensation is always performed distinctly.

Mr. *Méry* (*a*) attempted to establish the Doctrine of Air being mixed with the Blood in the pulmonary Vein; and being again discharged into the Branches of the *Trachea*, by the small Branches of the pulmonary Artery. His principal Argument in support of this Doctrine, was, That *Air* blown into the *Trachea* passed by the pulmonary Veins into the Heart, and that by blowing Air into the pulmonary Artery, it could be forced into the *Trachea*. Mr. *Bulffinger* at *Petersburg* undertook the Examination of these Facts, by a Variety of Experiments made with the Air-pump, by which he observed, that Water thrown in at the *Trachea*, ran out at both the pulmonary

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monary

(*a*) Memoires de l'Acad. des Sciences pour l'année 1700 & 1707.

monary Artery and Vein, and chiefly by the Vein, which neither Milk nor Air would do. Water injected into the pulmonary Artery, passed into the *Trachea* and pulmonary Vein, which Air also did: Water injected into the pulmonary Vein, was pushed with Difficulty, but at last ran into the *Trachea*, and not into the pulmonary Artery. Finding therefore that he could not force Air in any Trial from the *Trachea* into the pulmonary Blood-vessels, he concludes Mr. *Mery's* Experiment. and consequently his System to be false, but makes an Apology for him, by showing how readily his seeing the Air, which had been lodged in the Blood-vessels before the blowing into the *Trachea*, or what enters in the Time of it, at the cut Vessels, might have led him into the Mistake, as it had done at first to some Gentlemen who saw Mr. *Bulfinger's* Experiments, till he undeceived them. *Comment. Acad. Scient. Imperial. Petropol. Tom. III. p. 230.*

Mr. *Hales* in his first Volume of Statical Essays, had given us by the Way some Experiments relative to the Force wherewith the Blood is propelled from the Heart into the Arteries; and now in his second Volume or *Hæmastatics*, he has treated this Matter more fully, giving us all the remarkable Circumstances of the many hydra-

draulico-statical Experiments he has made with great Pains.

P. 31. He observes, “ That the Force
“ of the Blood in the Veins and Arteries
“ is very different not only in Animals of
“ different Species, but also in Animals of
“ the same Kind; and even in the same A-
“ nimal according to its different Circum-
“ stances: From whence he concludes it
“ requisite to be furnished with a good
“ Quantity of Observations, thereby to
“ find out the more nearly a Medium of
“ those Forces, not only in the same Ani-
“ mal, but also in those of different Ages,
“ Sizes and Kinds, whence happily some
“ curious Observations may arise.” And
indeed he has furnished us with a great ma-
ny very curious Experiments, which may
be of considerable Use in carrying on to the
desired Perfection an hydraulical View of
the animal Body.

In the mean Time he concludes from his
own Observations, That the Quantities of
Blood passing through the Hearts of differ-
ent Animals in a given Time, and the
Forces of the Blood in the Vessels are not
proportioned in any regular Way to their
Sizes, *p.* 44.

To give a Detail of all his Experiments,
would be to transcribe a great Part of the
Book

Book. We shall only give the Substance of a few of the cardinal Observations that are of the greatest Consequence, and most out of the ordinary Road.

The Force which the left Ventricle of the Heart suffers, or wherewith it squeezes the Blood in the Beginning of its Contraction is 113 *lib.* in a Mare, whose arterial Blood rose to 114 Inches perpendicular Height in a Glass Tube, fixed into the Carotid Artery, *p.* 21. In a Dog whose Blood rose 80 Inches high, he determined the Force of the Ventricle to be 33 *lib.* and a half, *p.* 38. And he thinks that in a Man of a middle Constitution, the Blood would rise 90 Inches, and the compressive Force of the Heart to be 51 *lib.* and a half, *p.* 40.

P. 48, &c. He gives an experimental Proof of the great Resistance the Blood meets with in passing through the small Arteries. “ And to this Resistance is owing “ the great Difference of the Force of the “ Blood in the Arteries to that in the “ Veins, *viz.* as 10 or 12 to 1,” *p.* 55.

Because equal Quantities of Blood pass through the Lungs, and all the rest of the Body in the same Time, it is commonly reckoned that the Blood has a much greater Celerity in that *Viscus*, than in its ordinary Course through the Body. To confirm
firm

firm and illustrate this, Mr. *Hales* observes, That the Parts of the Body through which there is a free Circulation, are about thirty Times heavier than the Lungs, *p.* 64; and that a Quantity of Blood equal to twenty eight Times the Capacity of the pulmonary Vessels passes through them in a Minute, *p.* 66. To strengthen which Calculus, he finds by microscopical Observations (*if the Computation were just*) the Celerity of the Blood in the small Arteries of the Lungs of a Frog, is forty three times greater than in equal Arteries of the Muscles, *p.* 68, 69.

Mr. *Hales* having observed the Lungs to be much dilated, by pouring in Blood into the pulmonary Artery of Lungs taken out of the Body, *p.* 75. and seeing the Lungs distended in a living Dog, after a large Incision had been made into the Cavity of the *Thorax*, concludes the natural Dilatation of the Lungs in living Animals, to be owing partly to the Blood forcibly propelled into them by the pulmonary Arteries, *p.* 77.

P. 323. From the Diminution of the Elasticity of the Air by the Breath of Animals, he takes Occasion to shew the mischievous Consequences of crowding many People together, as in Jayls, &c. and observes

serves of what great Benefit it would be to contrive those Places in such a Manner as that they might have a constant Eventilation, or new Recruits of fresh Air. A Precaution which *Ramazzeni* very judiciously recommended to be used in the Dormitories of Convents.

Mr. *Hales* in his first Volume had reckoned the Quantity of Moisture expired by the Lungs in a natural Day, to be about six Ounces and a half, almost the same *Santorius* reckoned from the Drops collected upon a Glass. But Dr. *Lister* thought that too small an Allowance by much. Now Mr. *Hales*, by making his Breath pass through dry Ashes, found the expired Moisture to be at the Rate of 9792 Grains, or $\frac{9792}{438} = 22 \frac{1}{3}$ Ounces, or 1,39 *lib.* *Averdup*, which falls in pretty nearly with Dr. *Thruston's* Conjecture, when he supposed the Quantity expired by the Lungs, to be equal to the Perspiration from all the rest of the Body.

Because in the common Method of injecting the Animal Vessels with a Syringe, one cannot be assured with what Force the injected Liquors are impelled; our Author thought of a Way of doing it, as it were, hydrostatically, by the Weight of the superincumbent Column of the injected Liquor

quor, which should be constantly uniform, and nearly equal to the Force of the arterial Blood, *p.* 145. And on this Occasion, *p.* 148, he makes publick Mr. *Ranby's* injecting Matter, which consists of *White Rosin* and *Tallow*, of each two Parts, eight Parts of *Turpentine Varnish*, and three Parts of the tinging Powder as *Vermilion* or *Indigo*, all duly mixed and prepared.

From his Injections and microscopical Observations, he alledges, that the very minute extreme Arteries arise all at right Angles from their respective Trunks, and do not form any Net-work or Inosculations with each other (as he allows the larger Capillaries to do) and that they are mostly inserted at right Angles into large venous Trunks. *See p.* 51. 67. 70. 150, 151.

From a careful Observation of the Appearance of common Flesh; Dr. *Lower* reckoned the Contraction of a Muscle to be owing to the Crispation of its Fibres. This seems to receive some Confirmation from a very curious microscopical Observation of Mr. *Hales's*, upon the Action of the Muscles in a live Frog, whose parallel Fibres he observed in Contraction to be changed into *rhomboidal Pinnulae*, *p.* 61.

This Author did not confine himself to
the

the Consideration of the Forces of the Fluids; he likewise gives us some new and curious Experiments of the Strengths of the Arteries, Veins, *Periosteum* and Ligaments, *p.* 155-----172.

He estimates the Pressure of the Stomach on the Aliments to be about 20 *lib.* instead of the immense and incredible Forces some had ascribed to it, *p.* 179.

Upon transfusing warm Water into a Dog, when the Blood came to be very diluted he died, *p.* 114. and had an universal Dropsy from the ouzing of the watery Parts of the too thin diluted Blood through the small Orifices that are not large enough to admit the red Particles, *p.* 116. *Lower* had formerly found the same Effect from making Ligatures upon the Veins.

As *Dr. Keil* had observed how some People are subject to Headaches and Flushings of the Face after Dinner, from the Distension of the Stomach; in like manner *Mr. Hales* remarks, that the flatulent are often subject to a short swimming or *Vertigo*, from the Wind distending the Gullet, and so pressing on the descending *Aorta*, whereby the Blood is too forcibly driven to the superior Parts, *p.* 183.

Although the Operation of several Medicines may be pretty well understood, yet
since

since it is making some Advance in Knowledge, further to illustrate even known Truths; our Author by injecting various Liquors showed their great Powers of relaxing or straitning the Vessels. Heat and warm Water were found to relax them. The Astringents he tried were cold Water, Spirit of Wine, Decoctions of *Peruvian Bark*, of Oak-bark, of *Chamæmel* Flowers, of *Cinamon* and *Piermont* Water, p. 127. --- 135.

Mr. *Hales* in his first Volume had observed that an urinous *Calculus* was the Body in the World wherein he found the greatest Quantity of Air wrought into its Composition, and thence conceived great Hopes of finding out some *Menstruum* which might rouse this active Principle, and so dissolve that most formidable Concretion, which has hitherto baffled all human Art and Contrivance. Many but fruitless were his Trials; however at length he found a *Menstruum*, and that not very acrid neither; which, tho' it could not well be reduced to Practice, has a great Power this Way, especially on the softer *Calculi*, from which we are encouraged to hope for greater Light and Advantage in this Matter. It is a Solution in Water of the strongest *Alkali*, and the strongest Acid just in the Act of
of

of Effervescence, to wit, *Salt of Tartar*, and *Oil of Vitriol*, or of *Sulphur*, p. 203. &c.

That the Effect of any *Menstruum* injected into the Bladder for dissolving the *Calculus* may not be prevented, by the Mixture of too much Urine, he proposes to make a continual Flow of Liquors into and out of the Bladder during the Injection, by using a *Catheter*, the Cavity of which is divided length ways, by a thin Partition, into two separate Channels, which end in two divaricating Branches. By one of these Branches he injects the *Menstruum* into the Bladder, in the common, or rather in the hydrostatical Way, while it returns mixed with Urine by the other Branch, p. 212.

Onions have a greater dissolving Power of the Gravel than some other hot alcalescent Plants, as *Scurvy-grass* or *Horse Radish*, p. 215.

The Gravel more readily attacks those of a hot Constitution, and Men, than People of a lax Constitution, and Women, because in the former the Urine is more highly alcalised, attenuated and digested, p. 217, 218. The more attenuated and digested Aliments are most liable to breed calculous Concretions, contrary to the Doctrine of the

the Ancients, *p.* 221, 222. Probably Stones increase most in the hot Seasons, otherwise than what *Aretæus* (*de Chron. Ec.* 11. 3.) reckoned, *p.* 225.

For better preventing the Gravel, Mr. *Hales* proposes lying as Soldiers do in their Barracks, not in a horizontal, but a reclined Posture, with the Head and upper Parts of the Body considerably higher than the Feet and lower Parts; whereby the Urine is not detained so long in the Kidneys, as to allow its tartarous Parts to attract each other. *p.* 229.

Our Author gives us a new and very ingenious Contrivance of a *Forceps*, for extracting a Stone sticking in the *Urethra*, which Mr. *Ranby* and other Surgeons have used with very good Success. He made it thus: “ He cut off the lower End of a
 “ strait *Catheter*, which made it a proper
 “ *Canula* for a *Stillet* or *Forceps* to pass
 “ through; the lower End of the *Forceps*
 “ was divided into two Springs like Tweezers, whose Ends were turned a little
 “ inward: These Springs were made of
 “ such a Degree of Tendernefs and Pliancy, as not to bear too hard against the
 “ Sides of the *Urethra* by their Dilatation.

“ When this Instrument is used, the
 C c “ Springs

“ Springs are drawn up within the *Canu-*
 “ *la*; which being passed into the *Urethra*
 “ as far as to the Stone, the *Canula* must
 “ then be drawn back so far as to give
 “ Room for the *Forceps* to dilate; which
 “ dilated *Forceps* being then thrust down
 “ a little further, so as to embrace the
 “ Stone, then the *Canula* must be again
 “ slid down, to make the *Forceps* take
 “ fast Hold of the Stone, so as to draw it
 “ out.”

Dr. J. Ad. Kulm Professor of Anatomy
 at *Dantzick*, observing the Difficulties
 which attend the Distension of the Bladder
 with a Liquor, in performing the high O-
 peration for the Stone, especially in Wo-
 men, has contrived an *elevatory Catheter*
 of the Bladder for that Sex. The Bending
 of it is fitted to the Turn of the *Os Pubis*,
 and its great Curve, instead of being only
 furrowed on the convex Side, is pierced
 quite through. He introduces this *Cathe-*
ter into the Bladder, with its Convexity
 to one Side; then gently raises it to the
Hypogastrium, and cuts securely upon it.
Nova Act. Erudit. Lips. Mart. 1732.

Saltzmanus relates an Instance of a
 Luxation of the Thigh-bone, without any
 Fracture of its Neck, and confirms what
Ruyseb had observed of the *Epiphyse* of
 the

the *Os Femoris* being as it were annihilated, or at least being changed, so as it could not be observed when sought after in one who had it broken. *Comment. Acad. Petropolit. Tom. III. p. 275.*

Oliver St. John Esquire gives the Design in Perspective of the *Arcuccio*, an Instrument to prevent the overlaying of Children, which the Nurses in *Florence* are obliged to lay the Children in under Pain of Excommunication. It consists of a semicircular Piece of Wood, or *Head-board*, of one Foot and an Inch Diameter, to each Side of which a Board three Foot two Inches and a half long is fastned. Each of these has a Hollow on the upper Edge, near to the *Head-board*, for the Nurse's Breast to rest in when she gives Suck, and a semicircular Arch of Iron is fixed to them near the other End. From the Top of the *Head-board* to the Middle of the Iron Arch there is a Bar of Wood fixed, on which the Nurse leans when she suckles the Child. The *Arcutio* with the Child in it may be safely laid intirely under the Bed-cloaths in the Winter, without Danger of smothering. *Philos. Transact. Numb. 422. § 6.*

Dr. Wintringham's Commentarium nosologicum, being principally a concise Narration of Facts, will not allow of an A-

bridgment ; but we cannot but refer our Readers to the Book itself, where they may see an industrious accurate Comparison of the Changes of the Air with epidemick Diseases, accompanied with a very ingenious *Ætiology* modestly proposed. Among the many judicious Reflexions this Author makes on the Cure of Diseases, according to their different Circumstances, we shall only mention two that relate to the present raging epidemick Disease of this Place, the *Small-pox*.

p. 63. He never observed antiphlogistick Medicines that open the Belly, diluent Clysters, or such like, to have any bad Effect in this Disease, by weakning the Patient, or making the Swellings of the Face and Extremities fall ; but on the contrary, has always seen them very serviceable to young vigorous plethoric Patients, while too bound a Belly frequently produces at last a very dangerous *Diarrhæa*.

Quest. 23. He proposes in urgent Cases of the confluent Small-pox, where the Resorption of the variolous Matter is in great Danger of increasing the secondary Fever, that the Pustules should all be opened and treated as so many Ulcers by a Surgeon.

Dr. *Hilscher* Professor of Medicine at *Jena*, in a small Essay intituled, *Prolu-*
sio

sio de Amputatione & Rasura Capillorum in Variolis, recommends the cutting off the Hair in the Small-pox, by which Perspiration may be increased. This Method was practised on the King of *Spain's* Son *Don Carlos*, and on a *Saxon* Prince, with Success.

The Urine of phthifical People is said to be always specifically heavier than that of People in Health, or in any other Disease. *Commerc. Norimberg. 1732, Hebd. 44.*

The same anonymous Author who described the Colick that prevailed in *Amsterdam* in 1730, has continued his Dissertation on those Colicks, to show the other Causes, besides the Gout, on which they may depend; and consequently, how differently they ought to be treated. *Bibliothèque raisonnée des Ouvrage des Scavans de l'Europe, Tom. IX. 1. & 2. Parties.* In his last Paper he mentions some curious enough Observations he made on sucking Rabbits, that were taken with Vomiting, Purging and Convulsions, in the Stomach of which he found the Milk strongly curdled, and most abominably fetid.

Dr. *William Cockburn* Physician at *London*, distinguishes *Fluxes* into those from a *Stimulus*, and those from a greater than ordinary Secretion of a watery Substance

from the Blood into the Guts. The former is to be treated according to the different *Stimuli*. When it proceeds from indigested Food, Fruits, or such like, the common Methods will be successful enough, or it will cure of itself. When Bile is the Cause, it is more difficult. If the Piles, an Ulcer or Stricture of the Guts, act as *Stimuli*, the way of treating the Flux must be very different. And in the watery Flux, all the common Methods, of Purging, Vomiting, and Astringents, are hurtful. *Philos. Transact. Numb. 425. § 3.*

Dr. Dozar, in his Book called, *The ancient Physician's Legacy to his Country*, proposes Cures for Diseases that frequently are different from the ordinary Practice. We shall set down such of them as seem to be most uncommon.

According to him, a gouty Patient will be free of Pain two or three Hours at farthest after taking a Dose, which is from forty to seventy Grains of the following Powder. Take *Salt-petre* and *Tartar vitriolated*, each four Ounces; put them into a red-hot Mortar; stir them with a Spoon till they have done flaming; then powder them very fine; and after that slice in an Ounce of *Opium*: Grind these to a Powder; and afterwards mix with it an Ounce

Ounce of the Powder of *Ipecacuanna*, and as much of the Powder of *Liquorish*. This Powder is to be taken going to Bed, in a Glass of White Wine Posset-drink, covering up warm, and drinking a Quart or three Pints of Posset-drink while sweating.

Mynsicht's Elixir of Vitriol often taken, though it may cause Pain for some Time, yet most certainly destroys the gouty Matter, and must in the End have its desired Effect.

One who writes Notes to the Legacy, suspects the Doctor's Cure for a Dropsy, which he had not told, to be *Ol. Juniper*. or else an Infusion of Juniper Berries roasted, and made into a Liquor like Coffee.

His Cure for an *Anasarca* is an Electuary composed of *Steel*, prepared with *Sulphur* and *crude Antimony*, each an Ounce, *Diagridium* four Ounces ; make a fine Powder of these ; then add as much of any Syrup as will make a soft Electuary. The Dose, a large Spoonful at Night, going to Bed, and another in the Morning. Liquors must not be taken with this Purge.

Allom Posset-drink is an effectual Cure for a *Diabetes*.

A *Phthisis pulmonalis* or Consumption of the Lungs, is principally to be cured by frequent Bleeding in small Quantities. In

one Patient he determines the Quantity to have been six Ounces once a Day for a Fortnight.

The most beneficial Thing in all the World for the Lungs, is, in our Author's Opinion, to take an Ounce of *Quick-silver* every Morning. This is his darling Medicine which he also recommends in the Stone or *Nephritis*, Barrenness, *Chlorosis*, Diseases of the Stomach and Intestines, &c.

Green Fruit destroys Worms, ripe Fruit breeds them.

He recommends large Doses of *Mercurius dulcis* with *Cinnabar* of *Antimony* in the nervous or Head Diseases, *Palsy*, *Hemiplegie*, *Epilepsy*, *Apoplexy*.

He cured the *Plague* that had got among the Sailors in a Voyage to the *South Sea*, by one very plentiful Bleeding, he says, to the Quantity of a hundred Ounces, and with Drink sharpened with *Spirit* and *Oil of Vitriol*.

In spotted Fevers he recommends large Bloodings, purging every other Day, with a Paregorick at Night, and cooling acidulated Medicines in the intervening Days.

He cured a young Man of such a Fever, and a violent *Hæmorrhagy* at the Nose, by putting him into cold Water.

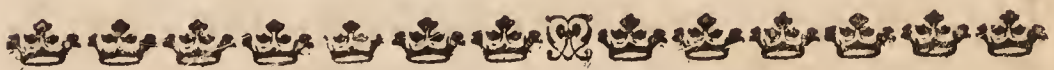
In the confluent and anomalous Small-pox he recommends *Mercur. dulc.* and *Cinnab. Antimon.* on the seventh and thirteenth Days.

In an *Angina* or *Quinsy*, beside high Bleeding, he recommends a *Gargarism*, composed of *sublimate Mercury* half a Drachm, *Cream of Tartar* two Drachms, dissolved in a Pint of Spring Water.

Bleeding, he affirms, is no Remedy in the *Rheumatism*, though this Disease is, in his Opinion, a high inflammatory Fever.

Fevers on the Spirits are cured by the *Bark*, in the same Manner as the Ague is.

In Diseases of the Stomach, our Author is against Vomiting; but thinks Purging more reasonable.



XXXV. *A List of Medical Books published since the Beginning of the Year 1732.*

Historia vitæ & meritorum Frederici Ruysch, Auctore Joanne Frederico Schreibero M. D. 4to, Amstelod. 1732.

Variolarum Antiquitates nunc primum e Græcis erutæ à Jo. Gothofredo Hahn Phil.

Phil. & Med. D. accedit de Mesuræ Syri scriptis ad Cel. Fabricium Epistola, 4to, Brigæ 1733.

Bartholomæi Lavagnoli in Patav. Gymnasio Med. Theor. Pr. *de usu pravo & recto disciplinarum optimarum in Medicina opus, in tres partes divisum, pars ima, de usu Chymiae*, Pataviæ 1732.

The State of Physick ancient and modern briefly considered, with a Plan for the Improvement of it, by *Francis Clifton M. D.*, &c. 8vo, London 1732.

A brief and distinct Account of the Mineral Waters of *Piermont* translated from *Seippius's* Treatise; as also a like Account of the Waters of *Spa*, extracted from the best Authors, by *George Turner M. D.* 8vo, London 1733.

A Treatise of Mineral Waters particularly of *Bath*, in *Somersetshire*, &c, by *J. Quinton*, M. D. 8vo, London 1733.

The natural, experimental and medicinal History of the mineral Waters of *Yorkshire*, *Derbyshire*, and *Lincolnshire*, by *Thomas Short*, M. D. 4to London, 1733.

Adolph. Gottlieb. Richter Ph. & M. D. *de Corruptelis Medicamentorum cognoscendis tractatus Medico-chymicus*, 8vo, Dresdæ & Lipsiæ 1732.

An Account of Mortifications, and of the
the

the surprising Effects of the Bark, in putting a Stop to their Progress, &c. by *John Douglass* Surgeon, F. R. S. 8vo, London 1732.

Jo. Helfrici Junkhen *Corpus Pharmaceutico-chymico-medicum. Editio tertia prioribus longe auctior reddita, per Davidem de Spina* M. D. Fol. Francofurt. ad Mænum 1732.

Dr. *Boerhaave's* Elements of Chymistry, faithfully abridged from the late genuine Edition published and signed by himself at *Leyden*. With all the Cuts and Explanations, as in the Original. To which are added, curious and useful Notes, rectifying several Opinions, &c. of the learned Author. By a Physician, 8vo, London, 1732.

Some Observations on the Translation and Abridgement of Dr. *Boerhaave's* Chymistry, wherein the learned Professor is vindicated from the unjust Representations, and weak Criticisms of his Abridger, in a Letter to *Cromwell Mortimer*, M. D. R. S. Secr. by *John Rogers* M. D. 8vo, London 1733.

Tabulae Anatomicae, in quibus corporis humani omniumque ejus partium structura & usus brevissime explicantur. Accesserunt majoris perspicuitatis causâ annotationes.

tationes & tabulæ aeneæ, Auctore Jo. Adamo Kulmo, Prof. Gedanensi, 8vo, Amstelod. 1732.

Josephi Pozzi Prof, Bononiensis Orationes duæ, quibus accedit epistolare Anatomicum commentariolum, 4to, Bononiæ 1732.

Lettre de Mr. Petit, Docteur en Medecine, &c. contenant des Reflexions sur des Decouvertes faites sur les yeux, 4to, à Paris 1732.

An Essay on muscular Motion, founded on Experiment, Observation and the Newtonian Philosophy, by Browne Langrish Surgeon, 8vo, London 1733.

Statical Experiments containing Hæmastatics, or an Account of some hydraulick and hydrostatical Experiments made on the Blood and Blood-vessels of Animals, &c. by Stephen Hales Rector of Farringdon, 8vo, London 1733.

Opere Fisico Mediche Stampate è Manoscritte del Cavalier Antonio Valiineri, raccolte da Antonio suo Figliuolo, corredate d'una Præfatione in genere sopra tutte, di una in particolare sopra il vocabulario della storia naturale, Tom. 1. Fol. Venet. 1732.

An Essay on the Improvement of Midwifery, chiefly with Regard to the Operation

ration, to which is added fifty Cases, selected from upwards of twenty five Years Practice, by *Edmond Chapman* Surgeon, 8vo, London 1733.

Henrici à Deventer, M. D. Ars obstetricandi, Editio 2da, cui novæ observationes accesserunt, 4to, Lugd. Bat. 1733.

Colloquia Chirurgica; the fourth Edition, by *James Handley*, 8vo, London 1733.

Traité complet de Chirurgie, par Guillaume Mauquest de la Motte Chirurgien, second Edition revue, corrigée & augmentée, en 4 Tomes 12mo, Paris 1732.

Rari casûs explicatio Anatomico-medica, Autore Thoma Schwenke M. D. Anat. Pr. 8vo, Hagæ 1733.

Morbi epidemici brevis descriptio & Curatio per Diaphoresim, Autore Joanne de Gorter M. D. & P. 4to, Harderwic. 1733.

Commentarium nosologicum Morbos epidemicos & Aeris variationes in Urbe Eboracensi locisque vicinis per sedecim annos grassantes complectens, Autore Cliftono Wintringham M. D. 8vo, Londini 1733.

An Essay concerning the Effects of Air on humane Bodies, by *John Arbuthnot* M. D, 8vo, London 1733.

Joan-

Joannis Freind M. D. *Opera omnia medica*, Fol. Lond. 1733.

La Medecine Theologique ou la Medecine crée telle qu'elle se fait voir ici sortie des Mains de Dieu Createur de la Nature & regie par ses Loix. On y a joint à la Fin les Theses de Medecine de l'Autheur de ce traité, Mr. Hecquet, 2 Vol. 12mo, à Paris 1733.

A Discourse on the Nature and Cause of sudden Deaths, 8vo, London 1733.

Observationes Medicæ, à G. Clinch M. D. 8vo, London 1733.

M. Ludovici Joannis le Thieullier in Universitate Parisiensi Regentis *Observationes medico-practicæ*, 12mo, Paris 1732.

The Ancient Physicians Legacy to his Country, being what he has collected himself in forty nine Years Practice, by Thomas Doar M. D. 8vo, London 1732.

Several Pamphlets for and against the preceeding Book.

The *English* Malady, or a Treatise of nervous Disorders of all Kinds, by George Cheyne M. D. 8vo, London 1733.

Le Brigandage de la Medecine dans la maniere de traiter les petites Veroles, & les plus grandes Maladies par l'Emetique, la Saignée du Pied & le Kermes mineral. Avec un traité de la meilleure maniere de

de guerir les petites Veroles par des Remedes & des Observationes tirées de l'usage. 12mo, à Utrecht 1732.

Observations de Medicine sur la Maladie appellée Convulsion, par un Medicin de la Faculté de Paris, 12mo, à Paris 1732.

A Letter to Sir Hans Sloane about the Cure of the Gout, by Dr. Stuckely, 8vo, London 1733.

Geo. Dan. Goshwitzius M.D. *De gravidarum & Puerperarum, nec non de infantum recens natorum regimine & affectibus,* 4to, Lipsiæ & Suidnicii 1732.

Jo. Phil. Burggravii jun. *Lexicon-medicum universale,* Tom. 1. continens A. B. Fol. Francofurti ad Mænum 1733.

Philosophical Transactions for the Year 1732, 4to, London.

L'Histoire & les Memoires de l'Acad. des Sciences, Année 1730, 4to, à Paris 1733.

Commercium literarium Norimbergense, Anni 1732. Semestr. 2. ——— Anni 1733. Semestr. 1. 4to, Norimberg.

Commentarii Academiae Scientiarum Imperialis Petropolitanae, Tom. III. ad Annum 1728, 4to, Petropoli 1732.



XXXVI. BOOKS *proposed*, and other medical News.

Josias Weitbrecht Professor of Physiology at *Petersburgh* is preparing a *Desmologia*, or a Description and Delineations of all the Ligaments of the humane Body.

Dr. *Trew*, Professor of Anatomy at *Norimberg*, is engaged in an Examination of the Ligaments of the Bones.

Dr. *Vercelloni* Physician at *Asti* is soon to publish a Treatise under the following Title, *Psycologia, seu motuum animalium & reciprocorum machinae animalis Theoria medica, omnes humanos actus autoptica & facili quamvis haecenus inauditâ methodo explanans*.

The surgical Academy at *Paris* mentioned in our first Volume, p. 361, will soon publish a Volume of Memoirs.

Dr. *John Arbuthnot* in the Preface to his Essay concerning the Effects of Air on humane Bodies, promises to complete his Account of the Non-naturals, by a Treatise on Rest and Motion.

Dr.

Dr. *Albrecht* Professor of Medicine at *Er-ford*, is preparing a Treatise *de effectibus musices in corpus Animatum in extenso*.

Dr. *Kestner* is composing a *Lexicon literarium medicum*.

The Chirurgical Academy at *Paris* has proposed the following Problem this Year, What is the Advantage or Disadvantage of different kinds of Tents used in enlarging Wounds, according to the different Circumstances of the Disease and Patient?

The Society of *St. Hubert* at *Lisbon* in *Portugal*, were to give their last Year's Prize to him who accounted best for the Cause and Nature of the Plague.

Dr. *Gohl* who published the *Acta Medicorum Berolinensium*, died in the 1732, but it is expected that Dr. *Chudenius* will continue that Work.

Daniel Fischer Physician at *Kesmark*, has undertaken to collect and publish the Observations of the *Hungarian* Physicians mentioned in our former Volume, and has dispersed an Invitation to engage them to communicate Papers to him.



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